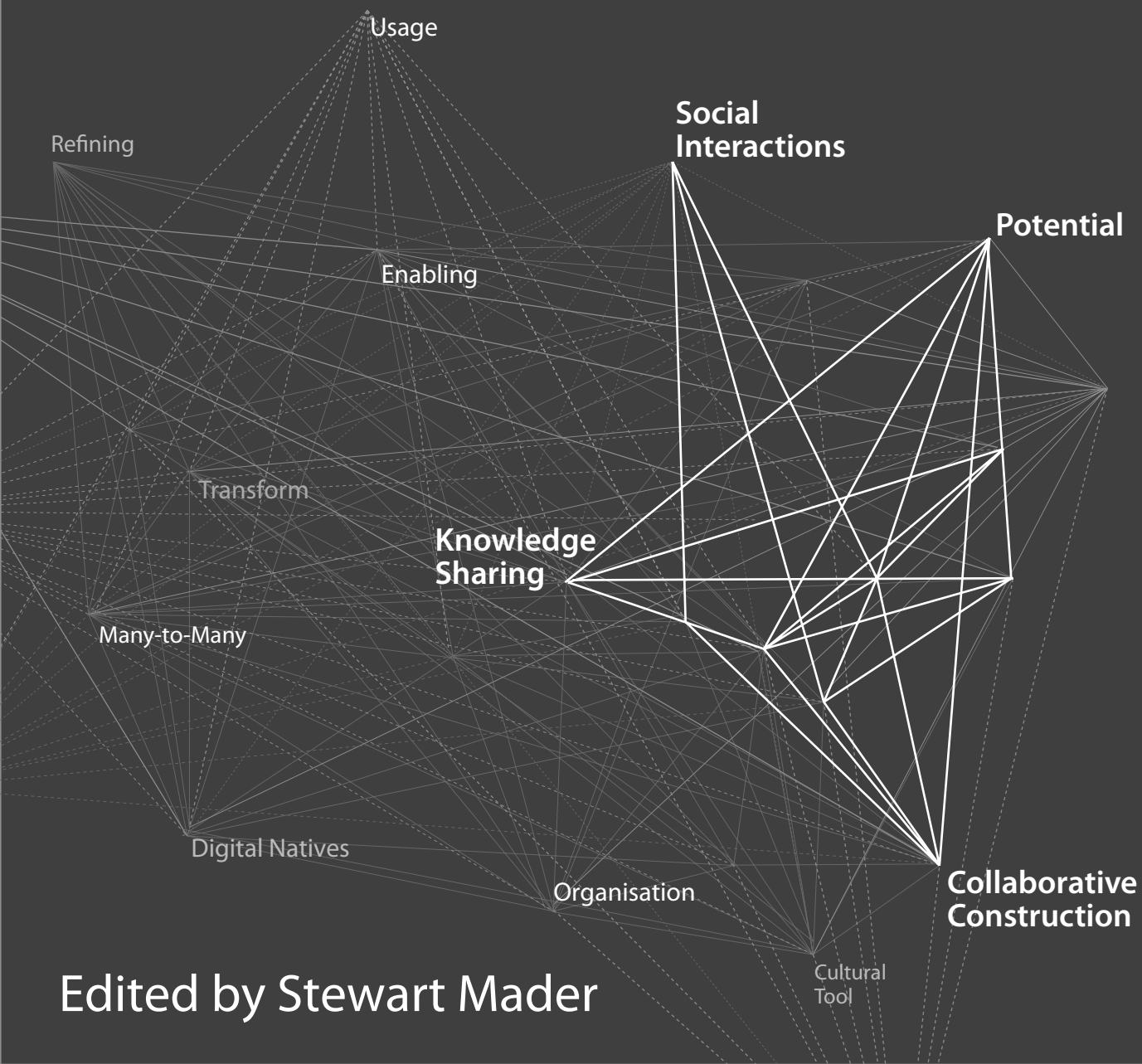
Using Wiki in Education

wikiineducation.com



Edited by Stewart Mader

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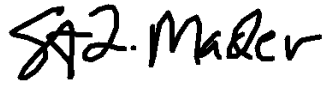
This book is a deep extension of the focus and content on my blog, Using Wiki in Education. It contains 10 case studies written by teachers that describe how they're using the wiki to transform courses and engage today's students in a range of environments including high school, small college, major research university, online/distance learning and research lab. This is the first book to focus specifically on the wiki in education, and to be developed and published using a wiki, so it actively demonstrates the tool in action. Who should read this book, and why is it published on a wiki?



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Foreword

Mike Cannon-Brookes
Atlassian Software Systems

Fundamentally, a wiki is a website that everyone can edit. Contributors don't need to learn complicated programming languages. No software is required beyond a web browser.

Wikis are simply incredible. They allow groups to share information to improve collaboration, foster knowledge sharing and enable learning. This ability to communicate is important just about everywhere—in large corporations, in small companies, in community groups and in charities—but nowhere more so than in the field of education.

At the most basic level, education is about the transfer of knowledge: a learned person, the instructor, passing information to someone who wishes to learn. Knowledge is gained slowly, over time, built up through small but constant additions. Ideas are expounded, theories are proved and discoveries are made. Knowledge is built layer upon layer. Wikis are designed to allow the facilitation of this process in a collaborative and transparent way.

As different editors—student, administrator, instructor—contribute to a wiki document, this same gradual layering of knowledge occurs. This underlines the fundamental power of a wiki. A syllabus can be created not by an instructor alone, but also by teaching assistants, other instructors, even students. A handful (or hundreds) of students can contribute to a class report, a research paper, or a school newspaper. The one-to-many model of knowledge transfer can be transformed into a collaborative, many-to-many network where every voice contributes

to the knowledge of the group; the sum becomes greater than its parts.

Anyone can start a new page on the wiki about a topic. From that initial seed, a second reader might decide to improve the article, and a third could add thoughts and details. Later still, the original author could return to revise and synthesize the new contributions. Every change is recorded so that the progress of a document can be easily tracked across interactions and through different authors. Documents are linked and organised to enable readers to browse or search for related information. Even the structure of the wiki—each page's relationship to the others—is open for the readers to improve.

With a wiki, nothing is ever lost. Wikis never forget an edit. Everyone can view the earlier versions of a document and review their peers' changes. This ensures that information isn't wiped out by accident. But more interestingly, it demonstrates how knowledge is grown and refined over the lifetime of a project.

* * *

Unfortunately, when I passed through high school and university, wikis didn't exist. My first experience of using one was in 2002 when we installed a small, Open Source wiki for the four developers in our software company. Our initial desire was to provide a central place to store basic specifications, technical documents, and team learning in a way that everyone on the team could contribute.

Four years after collaborating on our first wiki, things have radically changed. It's no longer just the four of us contributing. Our internal wiki contains the entire sum of our knowledge as a corporation—now thousands of pages of information. It is used by every staff member, every day for a wide variety of tasks. Our sales team tracks customers and collateral, our HR department trains new employees, our developer team debates software design and our management team tracks the company's progress—all within one simply editable, always current, universally available wiki.

Today, Atlassian's Confluence is the world's leading enterprise wiki. Around the globe it manages the contributions of hundreds of thousands of editors daily in thousands of organisations. The

amount of knowledge being published today from all spheres of professional and personal life is driving the evolution of the software.

To say I'm a huge wiki fan would be an understatement. Indeed, the rapid growth of Atlassian Software Systems has been both enabled and driven by wikis. Those early wiki applications were limited when compared with advanced, mature features available in today's wiki software, but the power of the wiki concept was clear from the beginning.

In this book, Stewart has collected a series of fascinating studies which show the remarkable range of ways wikis are being used in education—from kindergarten teachers to university researchers, online courses to high school libraries. Though Atlassian is on the forefront of wiki development, it's hard to predict where wikis will be even two years from now. It's not a stretch to say that the future development of wikis will be a collaborative effort. Wiki pages often end up in quite different places than their original authors ever imagined. And wikis will continue to evolve in more dramatic and interesting ways than any one person, or any one company, could dream up alone.

This foreword wouldn't have been possible without a wiki of course. Thanks to my writing collaborators and colleagues, Jonathan Nolen and Jon Silvers. And of course, thanks to Stewart for giving us the opportunity to pontificate on wikis.

Acknowledgements

"I'm a firm believer that the future belongs to the genius of the collaborative innovator."
Padmasree Warrior, CTO, Motorola (Business 2.0, September 2006)

I couldn't agree more.

The Web is becoming a place for the collaborative construction of information on an incredible scale, and the wiki is at the center of this transformation. Almost anyone you meet has heard of Wikipedia, and people are increasingly seeing how the wiki combines simplicity and power in a radically different, paradigm shifting way. In fact, I might venture to say that the wiki is the most significant development on the Internet since the web browser. Where the web browser enabled people to access online information in a radically different and better way that sparked the widespread growth of the Internet, the wiki enables people to directly and easily edit information in a way that encourages increasing participation and exponentially faster growth of online information. In essence, we are moving from passive readers to active participants.

When change takes place at this pace, there are people who willingly participate, learn as much as they can, and then share it with others. These teachers deserve the highest praise for enthusiastically embracing the new and unknown, transforming and improving the way they teach, and preparing their students to be seasoned pros. Seven such teachers have shared their

experiences and advice by writing chapters which form the core of this book, and for that I thank them immensely. They are:

Victoria Davis, Technology Teacher, Westwood Schools
Stuart Glogoff, Sr. Consultant, Learning Technologies, University of Arizona Learning Technologies Center
Jude Higdon, Project Manager, University of Southern California Center for Scholarly Technology
Peter Higgs, Senior Research Fellow, Creative Digital Industries National Mapping Project, Queensland University of Technology
Rick Reo, Faculty Support Specialist, Instructional Resource Center, George Mason University
Paul Schacht, Associate Professor of English & Assistant to the Provost for General Education and Assessment, SUNY Geneseo
David Wicks, Director, Instructional Technology Services, Seattle Pacific University Center for Scholarship & Faculty Development

Equally important in the development of the wiki are the people who make the tools. These people have the gift of foresight and the wherewithal to develop ideas into real, useable tools. They also listen, probably better then any other software makers, to the endless flow of suggestions, ideas, and issues from their users, and constantly refine their tools to meet our needs. One such maker is Atlassian Software Systems, an Australian company that develops Confluence, the wiki software powering the site you're using right now.

I had the great fortune of making a connection with Jon Silvers, Atlassian's Director of Online Marketing, and it turned out to be one of the most important milestones in this project. When I told Jon I was putting together a book on the uses of wiki in education, Jon volunteered to put me in touch with teachers using a wiki in their teaching and research, which ultimately resulted in the chapters contributed by Stuart Glogoff, Jude Higdon, and Peter Higgs. When I said I was looking to have development of the book take place on a wiki, Jon arranged for Atlassian to contribute a copy of Confluence, and put me in touch with Guy Fraser at Adaptavist, a specialty Confluence hosting provider in the UK. When I said I wanted

to include a foreword that helps give people a big picture sense of where the wiki idea came from and how it impacts education, Jon again lent himself to this project and arranged to have Mike Cannon-Brookes, Atlassian's co-Founder, write the piece. Jon is a selfless, willing, and valuable collaborator and I can truly say that without his involvement this book would not be what it is today.

A special thanks also goes to Guy Fraser of Adaptavist, the specialty Confluence hosting provider and bespoke developer that is generously hosting this book wiki. Besides hosting this site, Guy arranged for Adaptavist to contribute a copy of their Builder plugin so I could customize the site to the exact design you see now.

Finally, special thanks to two people whose willingness to support this project exemplifies the wiki way—Mike Cannon-Brookes, co-Founder of Atlassian, for finding time to write a foreword that reminds us why we root for the wiki as it radically transforms our work for the better, and Jonathan Nolen, Director of Developer Relations at Atlassian, for his keen insight and valuable suggestions for marketing the book.

All of these people represent the best of that genius of the collaborative innovator, and to them I offer a most heartfelt thanks.

Stewart Mader
September 7, 2006

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Four Letter Words

How Wiki and Edit Are Making the Internet a Better Teaching Tool

Stewart Mader

Technology is undoubtedly the language of an era in which connectedness is more important than boundaries. For ages people have defined boundaries—borders of countries, boundaries of empires, walls of cities—but now these boundaries are being erased to make way for greater progress, stability and cooperation. In the fall of the Berlin Wall and reunification of Germany, in the establishment and growth of the European Union, in the growth of global airline alliances like Star Alliance, OneWorld and SkyTeam—we see the benefits of connectedness. Germany elected its first female prime minister in 2005 and hosted the 2006 World Cup in gleaming new stadiums in 12 cities. The European Union has enabled countries in Europe to enjoy greater political stability and growing worldwide influence, a stronger single regional currency, and unprecedented economic and cultural growth. Airlines transport more passengers than ever, and 40% of the world's cargo by economic value,[1] sparking the rise of what UNC business professor John Kasarda calls the aerotropolis[2]—a city built around the airport as its centerpiece.

In this connected society students are digital natives.[3] They've grown up surrounded by technology as an integral part of everyday life, and are comfortable "speaking the language". In his seminal 2001 article "Digital Natives, Digital Immigrants" Marc Prensky says, "our

students have changed radically. Today's students are no longer the people our educational system was designed to teach."[4] Because many of its methods were developed before the rise of technology, education feels very much out of sync with the rest of the world digital natives are used to. Instructors who grew up learning in a step-by-step, lecture based, highly structured environment—the digital immigrants[5]—have difficulty adapting to and seeing the value in the multitasking, fast-paced, highly collaborative and boundary-less way digital natives prefer to work.

It is here that change must—and can—take place. Rather than blame students for not paying attention to long, theory-intensive lectures, and complain that students might not come to class anymore if technology is used, teachers should approach technology with an open mind. By doing so, teachers can take advantage of the tools and language students are already using to build a better, more productive relationship with their students. Just as the ancient Sumerians used a stylus and tablet as their tools, and cuneiform as their language, and the Egyptians used papyrus as their tool and hieroglyphics as their language, so must we become fluent in the language of technology and use its various tools for greater connectedness, collaboration, and construction of knowledge.

This book focuses on one such tool: Wiki. A wiki is a web site that can be individually or collaboratively edited using just a web browser. No special tools and no special skills are required. At its simplest, it can be read just like any other web site, but its real power lies in the fact that groups can collaboratively work on the content of the site without constantly emailing Word documents and tracking revisions from multiple authors who can't see each others' changes. The wiki is gaining traction in education, as an ideal tool for the increasing amount of collaborative work done by both students and teachers. Students might use a wiki to collaborate on a group report, compile data or share the results of their research, while faculty might use the wiki to collaboratively author the structure and curriculum of a course, and the wiki can then serve as part of each person's course materials.

The most recognizable wiki is Wikipedia, the online encyclopedia that anyone can edit. Wikipedia is the largest encyclopedia ever created—print or electronic—with articles in 229 languages,[6] including 1,277,762 articles in English,[7] 334,099 articles in French,[8] and 423,250 articles in German.[9] It's important to note that Wikipedia is one instance of how wiki technology can be used, and is the most open application possible since anyone with an

Internet connection can edit, and can do so anonymously. This may sound radical at first, but the spirit of the idea is that a wiki enables collaboration on an unprecedented level, and this can be applied to a myriad of different situations in education to great benefit.

The name "wiki" is the Hawaiian word for "quick", and the name of the rapid bus service between terminals at Honolulu International Airport. Ward Cunningham, creator of the wiki idea, was looking for a recognizable, unique name and found it while travelling in Hawaii. In the relatively short time since he created the first wiki, WikiWikiWeb, on March 25, 1995[10] a range of tools are now available for people interested in using a wiki. These range from free, open source software like MediaWiki to free or low-cost web hosted services in which you create an account and have your wiki up and running in minutes, to enterprise tools like Atlassian Confluence and SocialText which enable an organization to host multiple wiki web sites for an unlimited number of users. All are elegantly simple so that working with a wiki is—true to its name—quick. Unlike many software tools that have a steep learning curve, require training to use, and are advertised on the number of features included, wiki developers take the opposite approach. The resulting simplicity of the wiki has a compounding effect, that is, the more people use it, the more they want to keep using it and their contributions become vital to the growth of information and community.

Speaking of community, what makes a wiki unique is that it enables multiple people to see and collaboratively edit the same document, in the same "place". Here's where the wiki really resembles that Hawaiian bus service it was named for. People can easily come and go—some might make a small edit which is akin to riding the bus route for just one or two stops, while others might create new pages or make significant contributions and revisions to an exiting one, much like traveling the entire route on the bus. The wiki, like the bus itself, enables people to inhabit the same space, namely the page, and see the same thing, namely the text they are all editing, at the same time.

Before the wiki existed, collaboratively writing and revising a document might have gone something like this: one person would write a first draft, then email a Word document to each collaborator who would in turn make revisions and email her copy back to the original author. The original author would then have to find a way to combine all revisions into a new draft, and send that draft out for the group's approval. The logistics of this process—more formal, limited editing opportunities, blocks of time between contact with the document

(while revisions are being compiled), and the individual nature of editing limit the degree to which the document evolves. Furthermore, the person charged with combining edits is faced with a very delicate situation. Imagine that two of the collaborators have edited the same paragraph and have differing views—how would the person combining edits choose which to include and which to leave out? A scenario like this could quickly undermine the progress of the group.

Now imagine using the wiki for this document. The original author might write the first draft on a wiki page, and share the address (URL) of that page with the other collaborators. Now, rather than "pushing" separate copies of the document to each person, all collaborators are "pulled" in to a central place where everyone sees the same text. In order to keep the revision process organized, the wiki keeps a revision history of the page containing the document so users can see the evolution of the document over time. Because people have direct access to edit the wiki and changes are made instantly each time the page is saved, people have the flexibility to edit more frequently, resulting in a more refined document. Remember those two editors with conflicting revisions to their respective copies of the emailed Word document? Now with the wiki they can see each other's edits as they're made, communicate directly with each other and perhaps debate their differing points of view, then make edits that are mutually agreeable. Unlike the email/Word scenario, the wiki enables voices to be heard so that even if one point of view ultimately prevails in the finished document both editors will have communicated directly with each other, and agreed on what revisions prevail.

The above example demonstrates the power of the wiki to make collaboration more inclusive and knowledge construction efficient, distributed and fast. If you think about this visually, the email/Word scenario has limited periods of creativity separated by the logistical and socially sensitive task of combining edits:

The wiki completely changes this by shifting logistics to the shortest possible segment of time at the outset, leaving a much greater period of time for collaborative creativity and knowledge construction:

"There is no 'typical' use for a wiki."[11]

This book is intended to help you better understand how a wiki can transform what you do for the better. Through a compilation of case studies you'll see how different wiki tools have been applied to a variety of situations—from a major research university to a small liberal arts college, from open source to web-hosted and enterprise tools, from a high school technology course to a college freshman writing program. The first of these case studies illustrates how a wiki has been applied to a world-wide educational website to enable a growing community direct access to contribute and edit content. It also tells the story of how I became interested in the wiki.

Spectroscopy has something for everybody. Because it is the study of light interaction with matter, it is the science of seeing, whether with the naked eye or with highly precise instruments. It also relies on math to draw conclusions after data has been collected. For instance, in NMR spectroscopy, "the area under each peak or multiplet is proportional to the number of equivalent hydrogens responsible for that peak"[12] and students need to understand how to calculate this. But they also need to understand why they would use NMR spectroscopy in the first place, and this is where traditional ways of delivering information to students fall short. For example, the average chemistry textbook chapter is filled with theoretical and technical information, and usually has one page at the end briefly describing a novel application. This page isn't well connected to the rest of the chapter, and is even disconnected visually since a different layout and visual design are often used. Also, the fact that it appears at the end of the chapter means the best opportunity to engage and excite students might not even be seen. As a result, digital native students are left struggling to understand these concepts in the unified, big picture manner they're used to, and are left feeling that their digital immigrant instructors make their education not worth paying attention to compared to everything else they experience"[13]. This sentiment is manifested when disengaged students say, "I'm never going to use this in my career so why am I learning it?"

Faced with a situation where we needed to change how material was organized and presented, clearly illustrate its connections to everyday life and a range of careers, and maintain the interest of a wide range of students, we built a website. The Science of Spectroscopy www.scienceofspectroscopy.info was developed to engage students by first presenting a wide variety of applications, then leading to theory as the underlying explanation. From NASA projects to medical imaging, sunscreen chemistry, and microwaves, the applications are intended to appeal to the different interests of as many students as possible, and encourage them to understand how and why spectroscopy is used. This creates a learning environment in which theory and techniques can be taught with meaning, in which students will see relevance and meaning as they learn theory and techniques, instead of seeing it as useless and uninteresting.

Each application page gives a description and includes links to the appropriate pages describing the techniques involved and the underlying theory that explains the process behind the application. Some of the applications on the website include:

- **Thermal Infrared Imaging**—includes side-by-side visible light and infrared images of a wildfire in Yellowstone National Park. The visible light image shows just a cloud of smoke obscuring the land below, while the infrared image clearly shows the leading edge of the fire and the locations of hotspots. Links to pages describing how infrared light can be used to detect thermal signatures are embedded right in this description.
- **Decoding DaVinci**—a profile of Mauricio Seracini, an Italian art historian who uses X-ray, stereomicroscopy, and infrared imaging to look at the original drawings behind some of the world's greatest paintings. Author Dan Brown included Seracini as the only non-fictional character in The DaVinci Code because of the incredible stories of political subversion, religious mystique, and historical truth his work has helped tell.
- **Digital Fish Library**—a project of UC San Diego and the Scripps Institute of Oceanography to collect MRI images and data of the Institute's 2 million specimen fish collection and make them freely available in the Internet. This will enable scientists to instantaneously access spectroscopic data when they need it, instead of having to travel to the Institute and handle fragile specimens which degrade with exposure and handling.

Why Did We Start Using a Wiki?

As the site received publicity from reviews, publications, and conference presentations, an increasing number of users made suggestions, proposed new topics, and sent materials for us to add to the site, so it would better complement lessons and assignments. As the requests increased, I began to think how a system could be developed to get new material posted efficiently and with direct involvement from the community, which now included users from all over the United States, the UK, Germany Sweden, France, Australia, and Taiwan. While researching tools to help me manage the site, I discovered the wiki, which allows an entire community to maintain a site. The first powerful element of the wiki is ease of editing, and the second is its ability to keep track of the history of a document as it is revised. Since users come to one place to edit, the need to keep track of Word files and compile edits is eliminated. Each time a person makes changes to a wiki page, that revision of the content becomes the current version, and an older version is stored. Versions of the document can be compared side-by-side, and edits can be "rolled back" if necessary.

The ultimate goal of The Science of Spectroscopy is to become the most comprehensive source of information on spectroscopy available free of charge, and as I learned more about the wiki, it became apparent that it could do much more than simplify my work updating the site. It is the necessary tool to channel the support, involvement, and knowledge of a diverse community to:

- Create a clear, logical platform for any user to contribute content to The Science of Spectroscopy
- Ensure the long-term usefulness of The Science of Spectroscopy by creating a cycle of sustainability in which the content submitted keeps the resource relevant, and the resource's ease of use encourages any educator to submit content
- Introduce new content topics, such as cutting-edge applications of spectroscopy in astrobiology, space science and medicine, through collaboration with NASA Ames Research Center
- Increase the worldwide usability of The Science of Spectroscopy by enabling users anywhere to help build the site.

How Did We Design It?

"Because there is no physical analog to a wiki, designing an interface that allows multiple authors to simultaneously collaborate on multiple documents isn't an intuitive process. It's something that I, and many designers like me, are working out as we go along."[14] A wiki is both a technology tool and a community forum, and is unique in that it has no physical counterpart. This makes it both challenging because there's no exact historical precedent to guide the development of wiki software, or the conduct of wiki sites. This is also very liberating, and an example of the era we are just entering with technology, where new tools only exist in the online realm because they take advantage of maturing architecture that is only possible online.

For example, in order to make "writing" to the web easier, the makers of wiki software have created a syntax that simplifies the code and reduces the time needed to perform common tasks, like linking. Using HTML, a link would be written:

```
<a href="http://www.scienceofspectroscopy.info/skysight">Skysight</
```

and would appear in a Web browser as Skysight. Using Wiki syntax, the same link would be written:

```
[http://www.scienceofspectroscopy.info/skysight Skysight]
```

and would appear in a Web browser just like the highlighted link above.

For The Science of Spectroscopy, we designed the wiki to be as self-sufficient as possible, with a basic, obvious organization structure that mirrors how content was organized in the former, static site. The wiki main page has just three lists: Applications, Techniques, and Theory, and links can be quickly added as new pages are created. The only part of the wiki that is not "self-service" is account creation. New users must email a request to have their accounts created, so that we can screen out spammers and deter vandals or people looking to boost their search engine rankings by posting lots of links on wiki pages.

Engaging Teachers

One of the biggest barriers to involving teachers in technology-enabled curriculum development is how to solicit their input and build it into the curriculum in a meaningful way that makes the curriculum richer. Most technology tools only attract adventurous, early adopters because:

1. Copyright law is detailed, lengthy, and difficult to understand, so most teachers don't have the time or expertise to understand it. The gray areas in copyright law are so misunderstood and murky that if you ask ten different people, you'll get ten different answers, and each one will likely be to the benefit of the person answering you. This is a reflection on the complexity of the issue, and makes it really easy to see why people don't know what to do with materials.
2. Since the tools to create content have been had fairly moderate learning curves, most teachers haven't been inclined to create their own materials, even when they have the knowledge and expertise to do so.

Because of its natural ability to let authors focus on content over technology, almost-transparent yet familiar operation (uploading an image is like attaching a file to email, creating a link involves a syntax that looks more like natural writing than machine commands), and very low cost compared to most software, the wiki is showing potential to change how information is handled and built—potential whose precedent seems second only to the Internet itself. At its core, it really does enable people with knowledge and expertise in an area to focus on sharing their knowledge and collaboratively authoring materials. Coupled with the wiki, the growth of Creative Commons licensing is a critical catalyst because it provides an "in-between" full copyright and public domain, and a recognized way to give authors proper credit while legitimizing community editing and improvement so content stays fresh, comprehensive, and useful.

How One Person's Opposition to the Project Helped Articulate the Value of the Wiki

In January 2006, I was contacted by a professional organization for spectroscopy, which wanted to link to The Science of Spectroscopy. After we agreed on the link, etc. the

organization's web editor indicated that he opposed the link because he felt that the content in The Science of Spectroscopy was not as extensive as the content in Wikipedia. Here's my response:

> *"The Science of Spectroscopy is quite different from Wikipedia, and the point of putting material on a wiki is to encourage others to make it more comprehensive, better, etc. as they see fit. As much as I respect Wikipedia, I think that we'd all be ill served if one person decided not to improve one site just because he thinks another one is better. There are people who place a lot of credibility on the fact that people have to request accounts to use The Science of Spectroscopy, which allows us to screen out vandals and those looking to improve their own site rankings in search engines by randomly posting links wherever they can.*
>
> *While Wikipedia has a large volume of information befitting its role as an encyclopedia, the most important goal of The Science of Spectroscopy is to provide a place and a community where educators can come to work on curriculum together, using simple technology that transcends traditional school and geographical boundaries. Also, the way the wiki categorizes information by Applications, Techniques, and Theory, with Applications visible as the starting point is based on the original goal of the project. We want to engage students by showing how spectroscopy is important to their daily lives, and get them to ask why something works the way it does, so that when we teach theory they see it as meaningful, and more than just numbers or equations."*

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2

The Collaborative Writing Project

Paul Schacht
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The Collaborative Writing Project at SUNY Geneseo is a wiki hosting several different kinds of multi-authored student work: dictionaries, annotated texts, informational articles, essays, and an annotated bibliography. Below, I describe why and how I first began the CWP in Fall 2005; how the mere act of setting up the project changed my thinking not only about the pedagogical uses of wikis but about my academic discipline; how, in my first semester assigning work at the CWP, I dealt with several practical challenges; how the project has grown since that first semester; and where the project may be headed next.

Burke's Parlor

Toward the middle of the last century, the literary critic Kenneth Burke propounded a theory of human relations based on concepts from drama. Human history for Burke was a "'dramatic' process, involving dialectical oppositions."[1] Borrowing from the sociologist George Herbert Mead, Burke proposed that the drama of history draws its materials from an "unending conversation" about human affairs.[2] "Imagine that you enter a parlor," Burke wrote:

> *You come late. When you arrive, others have long preceded you, and they are engaged in a heated discussion, a discussion too heated for them to pause and tell you exactly what it is about. In fact, the discussion had already begun long before any of them got there, so that no one present is qualified to retrace for you all the steps that had gone before. You listen for a while, until you decide that you have caught the tenor of the argument; then you put in your oar. Someone answers; you answer him; another comes to your defense; another aligns himself against you, to either the embarrassment or gratification of your opponent, depending on the quality of your ally's assistance. However, the discussion is interminable. The hour grows late, you must depart. And you do depart, with the discussion still vigorously in progress.*[3]

Long before I launched the Collaborative Writing Project, I had begun telling my undergraduate literature students that Burke's parlor metaphor perfectly described their role, as well as mine, in the interminable conversation that is literary criticism. What my students needed to understand above all, I thought—and still think—is the difference between a reader and a critic. The first performs an activity that is comparatively private, the second an activity that is inescapably social. As readers, we may understand works of literature any way we please; as critics, what we can say about these works is more constrained. The others in the parlor will ignore you unless you've listened to the discussion and caught its tenor before putting in your oar; you will not find any allies if you don't know how to argue.

Not surprisingly, then, I'd been an early adopter—relative to my colleagues in the humanities, anyway—of conversation—enhancing web technologies, in particular electronic bulletin boards. Like its real-time cousin the chat room, the board is a virtual parlor where students can better learn how it feels to be a critic. They learn this already, to some extent, by writing papers, especially papers in which they engage the views of professionals in the field; but because papers are work submitted for one individual's approval rather than a contribution to genuine dialogue, the learning is incomplete. Class discussion adds to what students learn from writing papers, but most of the time class discussion is a series of bilateral exchanges between students and their professor rather than a multilateral discussion among peers; it resembles a receiving line more than it does a parlor. And its medium is the spoken word,

whereas literary criticism's "unending conversation" takes place mostly in writing. The bulletin board is hardly a perfect simulacrum of critical conversation, but it rounds out what students learn from paper-writing and class discussion by providing the opportunity for a multilateral exchange of ideas in written form.

When I first discovered Wikipedia—or rather, to be perfectly honest, when I first understood how it worked and realized that it had no connection to wicca (other than the fact that it appeared absolutely magical), I immediately saw it as yet another kind of virtual parlor. I wanted a wiki of my own where my students could mingle and converse. And I had a particular kind of conversation in mind for them: I wanted them to discuss a poem by singling out words and phrases for interpretive commentary, creating a unique page for each word or phrase that seemed worthy of comment.

What I saw in the wiki concept was the opportunity to do something that bboards don't readily allow, to create a virtual parlor containing not only talk but the object of that talk, with the object at the center and the talk fanning out from it in a roughly circular array. A first-time visitor to the parlor would be in something like the position of a museum-goer walking into a room where a sculpture is displayed and where knots of other visitors are already engaged in discussion of the sculpture's various features, each group focused on a different aspect of the sculpture's form or meaning. Whereas the basic organizing principle of the bboard is the conversational thread, a wiki would let me organize around the work of art itself. A latecomer to the parlor would begin by looking at the poem, not, as on a bboard, by sorting through threads named with possibly unrevealing or even misleading headers. The direction of the parlor-talk in each conversational knot would be set, not by a question from me (the usual procedure on my bboards), but by a question that students asked of the poem.

The wiki concept offered another opportunity as well, the opportunity for students to engage in asynchronous co-authorship. Whereas bboard users can only "reply" to one another's contributions, the editing capability that is the heart and soul of wiki software enables wiki users to "change" one another's contributions. As a result, they can speak with one voice (though from the record of their mutual edits—preserved on the "history" page associated with each wiki entry—one can, if one wants, reconstruct a kind of conversation). Although I grasped this capability from the outset—it's the basis of the Wikipedia, of course, as well as the reason for the word "collaborative" in the title of my own wiki—I did not see just at first

that it would force me to re-evaluate the sufficiency of Burke's metaphor as a model of the way literary criticism works.

A Visit from St. Nicholas

We are fortunate at SUNY Geneseo in having a technology office receptive to faculty requests for help in pursuing innovative pedagogies. One summer day in 2005, after looking over several open-source wiki solutions with our chief web specialist, I decided to go with the MediaWiki software, and a day later I had my site.

My plan was to try out the wiki on my Fall 2005 section of Critical Writing and Reading, a required course for first-year Geneseo students that teaches how to argue in writing and evaluate the arguments of others. Every section of Critical Writing and Reading, aka Intd 105 revolves around a single topic and a handful of texts. My topic for Fall 2005 was "The Battle for Christmas." Historian Stephen Nissenbaum's social history of Christmas in America bearing the same title would be one main text, Dickens's "A Christmas Carol'' another, and a chapter on the poem "A Visit from St. Nicholas" (better known as "Twas the night before Christmas") from Don Foster's collection of literary essays titled Author Unknown would be the third.

The first page I added to the wiki contained the text of "A Visit from St. Nicholas." To illustrate how a simple annotation of the text might look, I selected a phrase from the fifth stanza of the poem—"As dry leaves"—and linked the phrase to a page commenting on the two rather clumsily constructed lines that begin with that phrase: "As dry leaves that before the wild hurricane fly,/When they meet with an obstacle, mount to the sky..." My annotation untangled the syntax of the lines and explained that they represent an example of epic simile, a literary convention at least as old as Homer.

Proud as I was of my sample annotation, looking for all the world like a page of the Wikipedia, I felt that something wasn't right. The annotation wasn't an interpretation so much as a gloss; in writing it, I wasn't really "putting in my oar." I couldn't imagine anyone offering an "answer" to what I'd written. My illustration of parlor-talk, designed to show my students how to be critics, was more or less a conversation-stopper. I wasn't setting them a good example at all.

On the bright side, though, I was providing useful information, information that could

make the poem more accessible and meaningful to them. Not only could I see no reason not to do this, I saw no reason why they shouldn't do the same for each other. If there was something amiss with my page on "As dry leaves," perhaps it wasn't because I'd failed to put in my oar. Perhaps it was because the image of the critic as the pilot of a boat of which he is the sole occupant does a disservice to criticism. Critics sometimes sit together in one boat, rowing in unison to propel the boat by force of their combined strength.

I don't mean simply that literary critics occasionally engage in co-authorship, but that even when working as individuals, often enough they see their work as a contribution to a collective enterprise. This is especially the case when they undertake to improve the general quality of criticism's "unending conversation" by grounding the conversation in facts that their interlocutors haven't known previously or have too often overlooked—facts, for example, about an author's life or historical moment, facts about the text and the conditions of its publication—or by informing their interlocutors (who, as Burke notes, are by necessity always latecomers to the party) of what has been said about a given literary work or critical subject in the past. It's the possession of such information that makes participants in any conversation what we call "conversant": that is, intelligent parlor-guests with the power to move the conversation forward.

Now, college students of literature are far more conversational than they are conversant, and a large part of our job as teachers of literature is to address this shortcoming by providing them with information. In untangling "As dry leaves," I had been doing a bit of just that. By asking them to do the same for themselves, I would be encouraging greater self-sufficiency (another part of the teacher's job), but more important, I would be making my class a more accurate model of the critical community at large. I would be letting my students move back and forth, as professional critics do, between rowing their own boats—offering interpretive perspective—and joining the galley on the big boat, informing the conversation with facts.

But why stop with annotating bits and pieces of the text? Why not allow them to do some research on "A Visit from St. Nicholas" and publish it on the wiki as an informative essay? I created a page titled "All About 'A Visit from St. Nicholas'" and decided to let my Intd 105 students contribute content to it in place of writing one of the six required papers in the course.

In creating this new page I was inviting my students to collaborate as genuine co-authors, not merely as multiple contributors to a common enterprise. Having originally conceived the Collaborative Writing Project as a space for conversation, I now saw the Project as a home for multiple spaces in which students might work jointly in a variety of ways, preserving their individual voices and perspectives to a greater or lesser extent depending on the particular purpose of each space.

Practical Challenges: Skill, Motivation, Evaluation

I began my fall semester, then, with a pretty good idea of how I wanted to use the wiki, and two pages ready and waiting for student content. All that remained was to get my students to add that content and to figure out how I would give them credit for their work. All that remained, in other words, was the hard part.

When you get stuck doing something on your computer, the popular wisdom goes, you should ask the nearest seven year-old for help. I'm looking forward to the day that seven year-old enters my classroom; presumably she won't need the kind of hand-holding that my mostly 18-22 year-old students need over anything technological. They may all have accounts on Facebook, but many of them still have trouble attaching a file to an email.

To deal with students' anxieties and uncertainties around technology, I've made it my practice to devote plenty of class time at the beginning of the semester to explaining my expectations and demonstrating how to carry out such basic required tasks as posting to the bulletin board, starting and maintaining a blog, and submitting work electronically. As the number of these tasks has grown, though, I've begun to feel that all the explaining and demonstrating creates too long a running start for the course and hinders my efforts to get students excited about the subject-matter, be it Christmas in America, the practice of literary criticism, or British literature since 1700.

This semester (Fall 2006), I've cut back significantly on in-class technology instruction by creating a series of video tutorials, each of which covers a single task, such as replying to a bulletin board post, emailing a paper, or editing the Collaborative Writing Project wiki. I used Snapz Pro X 2 from Ambrosia Software on my Mac to make these one-to two-minute screencasts and QuickTime Pro to edit them and add voiceover audio. (The Snapz software will let you record your screen and voiceover audio simultaneously, but I find that it works

better to record the audio as I watch the already-captured video than to speak while I point and click. I record the audio track using Audio Hijack Pro from Rogue Amoeba.)

When I rolled out my wiki in Fall 2005, I was leery of making its use a course requirement, since I was already expecting my students to blog and post to the bulletin board. So I offered two ways to edit the wiki for extra credit. Students could add up to 10 points to the grade on one paper (out of six required in the course) by helping to annotate "A Visit from St. Nicholas." If they chose to help create the informative article "All About 'A Visit from St. Nicholas,'" they would be excused altogether from writing the third paper of the semester.

I expected more students to choose the first option, which was risk-free and seemed pretty painless, than the second. But in the end, only four different students annotated words or phrases from Moore's poem, whereas 18 students—more than 80% of the class—helped build the page about the poem rather than write the third paper, despite the risk that they might prove less successful at this unfamiliar task than at conventional essay-writing.

I confess that I did my best to make the risk seem worth taking. I made the topic for the third paper a little tougher than those for the first two, and I reassured my students that they could spend most of their collaborative writing energy executing whatever writing task they did best: gathering information and getting it down in rough form; organizing; editing for clarity, continuity, and grace; correcting spelling or punctuation. Everyone, I told them, would be expected to make some contribution to the page's factual content; however, the whole point of working as a group was to bring their varied strengths together so that no one's weaknesses need matter greatly.

Still, each knew that one's final grade on the assignment would reflect both the quality of one's individual contributions and the logic, coherence, and polish of the article or essay. To their credit, the students who contributed were willing to bet on their classmates' commitment to producing a high-quality final product.

One thing they didn't have to worry about—and herein lies, to my mind, one of the greatest virtues of the wiki as a tool for collaborative work—was that some contributors might walk away with a high grade in exchange for little effort, freeloading off the commitment of others. I showed them how the wiki enabled me—and them—to track each user's participation in the project. In the end, a student whose contribution amounted to a few brief, marginal paragraphs earned a C$^-$ for the assignment, while two students who contributed a large quantity

of excellent material earned a grade of A+. Other grades ranged from B- to A.

When completed, "All About 'A Visit from St. Nicholas'" was not as well-organized or as polished as I would have liked. Many articles on Wikipedia are similarly rough, of course, reflecting the absence of supervisory editing. During the approximately two weeks that the article was in process, I twice used the page's associated "discussion" space to make suggestions for tightening the article's structure and wording, but my suggestions had only a minor impact.

Moreover, I found myself unable to develop a sensible mathematical formula (as I half-suspected, from the outset, would be the case) for combining the finished product with individual contributions to arrive at each student's grade. Although the article as a whole deserved perhaps a B+, I thought it unfair to award those two students who had taken the lead and done the best work with anything less than the highest possible grade, especially since their early excitement for the project had proved instrumental in bringing other students on board. My "calculation" of the other students' grades was similarly intuitive, with the result, I think, that the grades at the ends of the spectrum were determined most by individual performance, while those in the middle derived the greatest benefit from the project's overall quality. As an English professor, I wasn't bothered much by this rough method of evaluation, which at least honored the spirit, I believe, of my original contract with the students. Judging from the absence of complaints, the students weren't bothered either.

What my students' page lacked in organization and finish, it made up for with unexpected thoroughness and verve. At roughly 4000 words, "All About 'A Visit from St. Nicholas'" offers a solid and spirited, if at times somewhat rambling, discussion of the poem's murky provenance, enduring popularity, and complicated relationship to the history of Christmas. In their enthusiasm, the students put more than 3140 additional words on related pages covering Clement Clarke Moore (the most likely author of the poem), Henry Livingston, Jr. (a rival claimant), Joe Nickell and Don Foster (critics who have written on the authorship controversy), and the historical development of Santa Claus. They filled out these pages with appropriate images imported from elsewhere on the Web. And although few of these students were familiar with Wikipedia when the semester began, their many links to Wikipedia entries (*Washington Irving, Thomas Nast, Zwarte Piet, the New York Historical Society, Jeffersonian,*

patrician, plebeian, Doomsday, Norse, Thor, Santa Claus is Coming to Town, and Rudolph the Red-Nosed Reindeer) demonstrated how quickly and completely they had grasped the power of wikis to put information and ideas, as well as users, into relation with each other.

"If you contributed to the Wiki for Paper 3," I asked my students in an online survey, "did you find the experience worthwhile?" Seventeen of 18 contributors answered "Yes." Among their comments: "I thought it was a great way to try and combine all the knowledge we had obtained by that point. It helped to bring all the facts together in a more coherent fashion." "I liked having the people who knew the best about a subject write about it. Everyone could find their own niche in the wiki." "I loved the Wiki project. I not only learned how to edit and use Wikipedia, but I also loved the finished product. It was enjoyable to contribute based on my strengths instead of struggling over my weaknesses. I personally thought the page looked very good when we were done!"

The one negative reaction highlights a challenge that I hadn't, but probably should have, anticipated: "At first, I thought the Wiki was an amazing idea, especially when I knew that it was a group experience. However, some students jumped right in and basically took it over. There wasn't much left to do." This complaint was echoed by another student who nevertheless found the experience worthwhile overall: "The only thing I didn't like was some people did the entire assignment right away, and I felt like I didn't make a worthwhile contribution even though I was capable of doing so." Although one of these comments may have come from a student who waited until the day before the project's official closing date before posting (the others all posted within the first week of the two weeks allotted), a good collaborative essay-writing assignment should probably include some safeguards to keep the brightest, most eager students from intimidating others.

The Project Expands

More than happy with the Collaborative Writing Project's first semester, I added two new pages for my Spring 2006 classes. One of these classes, English 170 (The Practice of Criticism) is our department's introduction to literary criticism; the other, English 315, is our survey of Victorian literature. I asked my 170 students to begin building a dictionary of literary terms and my 315 students to begin building an annotated bibliography of Victorian literature.

"Begin" is the important word here. I'd conceived the article about "A Visit" as a single-class project, whereas the dictionary and the annotated bibliography were meant to be inherited by my future sections of 170 and 315. I used this "legacy" dimension of the new pages to motivate my spring classes, appealing to their community spirit by pointing out that their work today would benefit students to come.

Meanwhile, I myself began to appreciate more fully the wiki's power to create community. I divided the learning outcomes for my spring courses into two categories: individual learning outcomes and community learning outcomes. The latter were to be outcomes for the entire class, such as producing and sharing knowledge. I explained to my students that these course outcomes were analogs of those for which the larger, scholarly community strives.

The Dictionary of Literary Terms is an alphabetical list that includes entries such as Metonymy and Narrator. I set up the list, then told my students to link each entry to a page providing a definition and examples drawn from the semester's readings. In future semesters, I'll ask students to refine the definitions and add more examples.

The Annotated Bibliography of Victorian Literature is a list built by students themselves. My students in English 315 delivered oral reports throughout the semester on scholarly articles they'd found through library searches. Each student, after delivering a report, added a citation to the list for the work in question, then linked it to a page providing a summary of the article. Since another requirement of the course was to write a critical essay using at least two scholarly sources, the annotated bibliography served, among other things, as a place where everyone could go in search of topic leads and critical perspectives.

From the first, I'd envisioned the Collaborative Writing Project wiki as a space to be used not just by me but by other SUNY Geneseo colleagues as well. An English Department colleague who teaches a course titled History of the English Language has in the past asked his students to identify and define colloquialisms unique to Geneseo; when I learned of this assignment last spring, I recruited him for the CWP, where his Fall 2006 students have begun building a Dictionary of Geneseo English—an urbandictionary.com for Geneseo that can now grow each time the class is taught. Another colleague has a small group of students working to annotate Wallace Stevens' poem "The Emperor of Ice-Cream" and to build an informational page on Stevens' collection Harmonium. Yet another colleague—this one in

Sociology—has asked his students to write a collaborative essay discussing their various field experiences for his Fall 2006 hands-on course in Community Organizing.

Final Reflections

I began my course in The Practice of Criticism last spring by introducing my students, as usual, to Kenneth Burke's parlor metaphor. Between my bulletin board and the wiki, I now had two virtual spaces in which students could bring this metaphor alive through their own activity. In the wiki, I also had a means to illustrate the limitations of Burke's metaphor and the communal dimension of literary scholarship. I'm convinced that the students' exchange of perspectives and their collaborative efforts made their learning about the purposes and methods of literary criticism more intentional than that of my students in past semesters.

This fall, I am finally using the wiki as I'd originally planned: as a place for students to mark up a text with interpretations. In annotating "A Visit from St. Nicholas," my students in Intd 105 followed my lead and created informative rather than interpretive commentary. I've asked my Fall 2006 students in British Literature Since 1700 to link words and phrases from poems by Blake and Keats to pages that relate those words and phrases to the poems' larger meanings. I've also asked these students to begin work on a Dictionary of Literary and Critical Movements.

I'm more intrigued than ever by the teaching potential of multiple-author essays such as my students' article about "A Visit." I suspect that once they graduate, students are likely to do more collaborative than individual writing—except for those who enter a handful of fields such as creative writing, journalism, or academia in one of its humanistic branches—and that they will do this writing in a virtual environment of some kind, quite possibly a wiki. Even academics in the humanities have to write collaboratively from time to time—for example, in producing self-study reports for a department or for accreditation. (I've been urging administrators at my own campus to use a wiki for our next report to Middle States.) Collaborative writing of this kind demands skills that in a college curriculum are best taught through multiple-authorship assignments.

Is it possible, I wonder, for a large number of authors to collaborate not only on a report or informational article but on a work of literary exegesis? The idea may seem to violate the spirit of interpretation—usually understood as a highly subjective process of meaning-making—but

as Burke's parlor metaphor makes clear, guests at literary criticism's party win credibility only by attracting allies, and they can only do this by following the canons of literary argument. These constraints naturally produce large areas of intersubjective agreement, so that at any given time in the party's interminable existence, there is broad consensus on many interpretive matters. What if the furious individual rowing that produces this consensus took place in one room (remember that the mixed metaphor is Burke's), while in another what we heard was simply the consensus itself? In other words, what if 35 students worked out a shared interpretation of a poem or a short story through multiple edits of a single page, using the associated "discussion" page to lay out, work through, and where necessary hold onto their differences?

I'm not ready to try the idea this fall, but down the road, I'd like to.

References

[1]Kenneth Burke, The Philosophy of Literary Form: Studies in Symbolic Action, 2nd ed. (1941; Baton Rouge: Louisiana State Univ. Press, 1967) 109.

[2]Burke 110.

[3]Burke 110.

3

The LTC Wiki

Experiences with Integrating a Wiki in Instruction

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The University of Arizona's Learning Technologies Center's (LTC) mission is to implement and support educational technologies for the campus community. One way that the LTC realizes its mission is by hosting centrally licensed technologies such as learning management systems, computer and video conferencing systems, webboards, MOOs, and blogs. As Sr. Consultant for Educational Technologies in the LTC, one of my responsibilities is to explore new technologies and evaluate their usefulness for campus instruction. This involves partnering with UA instructors and faculty, and testing technologies with courses that I teach as an adjunct professor with the UA School of Information Resources and Library Science (SIRLS). By introducing new educational technologies in my courses, I am better able to assess their applicability.

In May 2004 the LTC installed MediaWiki, open source wiki software originally written for Wikipedia. This chapter reviews how I have used the wiki in three of my classes since summer 2004, describes the students' experiences with their wiki assignments, and looks at future plans for using a wiki in my courses.

Summer 2004 IRLS 613 Decision Making for Information Professionals

IRLS 613 was a three-credit course taught to approximately 35 students dispersed across North America and delivered virtually over 10 weeks. The course introduced students to the many facets that comprise effective information systems and different decision-making techniques used to analyze these systems. Students studied technological evolution, information architecture, the types of systems available to information seekers, and methods of analyzing and evaluating the impact such systems have on library users. The relationship between different technologies and their design was emphasized as a method to better assess and evaluate a system's effectiveness. In addition to the wiki, students in this class used a learning management system, threaded discussion forums, blogs, chat rooms, email, and the Web. Assignments were posted as entries on discussion forums and individual blogs. Students were expected to add substantive comments to those entries to further our collective knowledge of subject matter.

Before reviewing the summer 2004 students' wiki experiences, an assignment in the summer 2003 IRLS 613 course bears mention. Students were assigned to research two technology topics from a list of fourteen and submit a synopsis of approximately 50-100 words. Topics for students in the summer 2003 course were: Tim Berners-Lee, Bath Profile, client-server architecture, DTD (Document Type Definition), Gopher, Internet2, Raymond Kurzweil, Moore's Law, open source, RSS, semantic web, XML and Z39.50. They were also invited to find a topic not on my list that was new to them. Assignments were submitted as word processing files from which I created a webpage displaying everyone's contributions. Students were instructed to read each other's work and share their thoughts on a learning management system discussion forum.

For the summer 2004 course I revised that assignment to use the wiki and created a page including the summer 2003 students' definitions. I named this page Glossary-pedia *(figure a)*. Students in the 2004 course were instructed to read the technology terms created by students in the summer 2003 class and were assigned "to build new content on the IRLS 613 wiki's Glossary-pedia." Each student was paired with another, assigned two topics and instructed "to collaborate on adding an entry to the IRLS 613 Glossary-pedia." Topics for students in the summer 2004 course were: Bluetooth and Wi-Fi, Children's Internet Protection Act, Digital Object Identifier (DOI), Institutional Repositories, Internet Archive and Brewster

Kahle, ISOC (The Internet Society), Steve Jobs, learning objects, Clifford Lynch, NINCH, Open Archives Initiative (OAI), Paul Evan Peters, RSS feeds, and Spyware. I provided a short guide to creating entries in the wiki and described my expectations in an email *(figure b)* sent to all students.

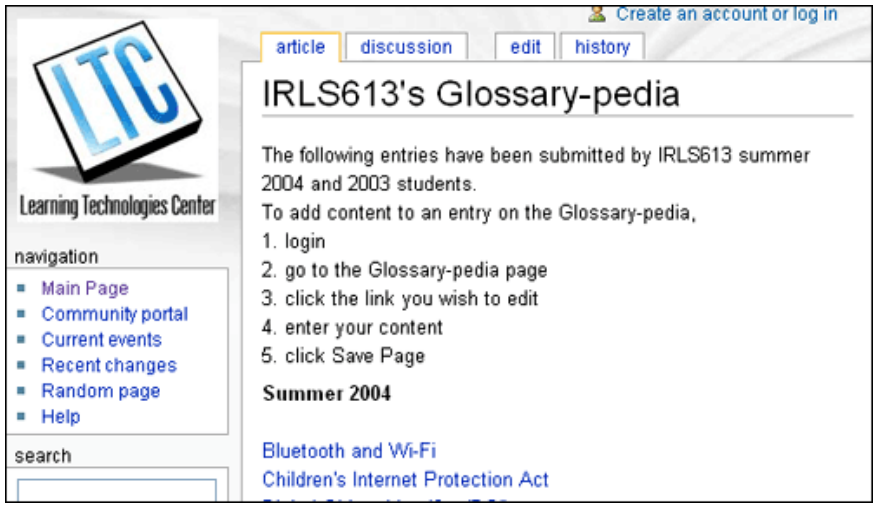


figure a

From: Stuart Glogoff
Subject: Glossary-pedia assignment
Date: Summer 2004
To: IRLS613 Class

The purpose of this assignment is to give you a reason to do something mildly collaborative in this wiki. I picked different technology topics that are of current interest in the field or technologists who have been important to furthering a networked society. ...You will need to collaborate with your partner on how you will divide the work, how you will work together to compose your entry and edit it. ... I will grade your contributions to the glossary-pedia in terms of a total value of 20 points and assign whatever I come up with to the two of you equally. ... Most of you are not going to be close enough to each other to meet in person. Adds a level of complexity, doesn't it. I'll be interested in hearing how you worked it out.

figure b

The HTML editor in the wiki is not intuitive. I was interested in seeing, if through the dynamics of small group collaboration, which students would learn how to use the HTML editor to its full potential. That is, include such features as a table of contents (TOC) with HTML named anchors to facilitate navigating *(figure c)*.

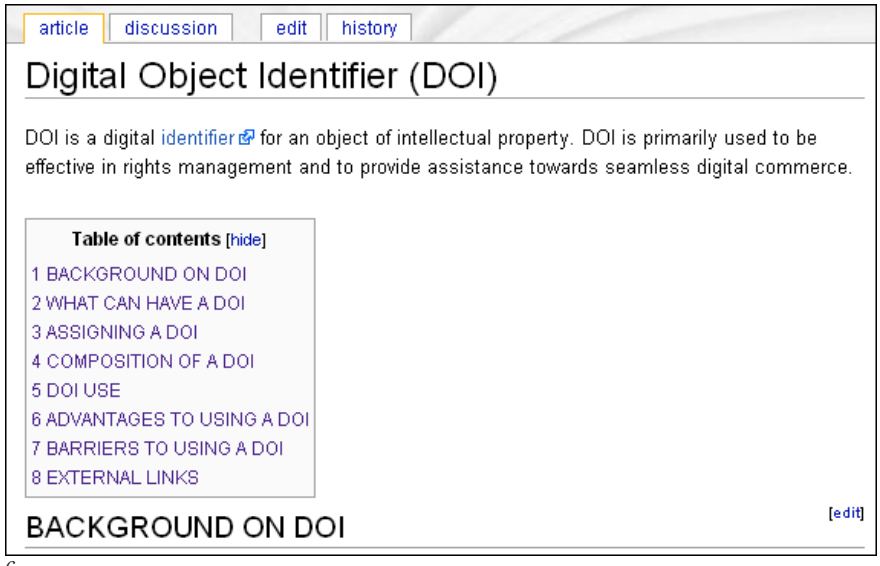
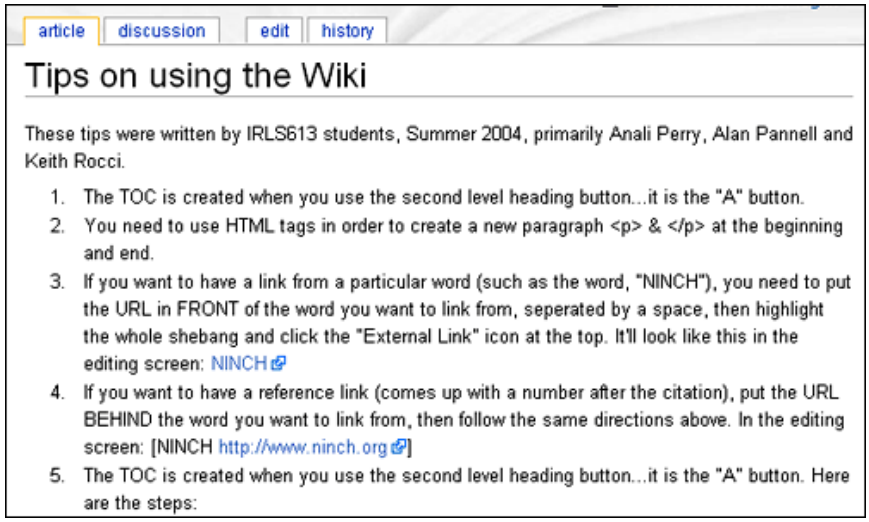


figure c

This assignment was worth 20% of each student's grade and all but two groups earned the maximum number of points possible. What was particularly interesting to observe was how three of the students worked together virtually to develop a page on the wiki called "Tips on using the Wiki" *(figure d)*. These three students were in three separate groups, which means that they self-identified to collaborate—within a virtual space—to develop the guide asynchronously over the Internet.

On the discussion forum, students expressed their impressions of wikis, how they might use a wiki in a real-world library situation, and raised questions about the reliability of wiki content. After grading all the assignments, I sent an email to all students reviewing my thoughts and observations *(figure e)*. In my message, I addressed how wikis bring a different model to information dissemination from the traditional tools that librarians have been trained to rely

upon for reference services. Interestingly, a number of my thoughts in July 2004 played out in the U.S. media during Fall 2005 when misinformation in John Siegenthaler, Sr.'s, Wikipedia entry became a national topic.


article discussion edit history

Tips on using the Wiki

These tips were written by IRLS613 students, Summer 2004, primarily Anali Perry, Alan Pannell and Keith Rocci.

1. The TOC is created when you use the second level heading button...it is the "A" button.
2. You need to use HTML tags in order to create a new paragraph & at the beginning and end.
3. If you want to have a link from a particular word (such as the word, "NINCH"), you need to put the URL in FRONT of the word you want to link from, seperated by a space, then highlight the whole shebang and click the "External Link" icon at the top. It'll look like this in the editing screen: NINCH
4. If you want to have a reference link (comes up with a number after the citation), put the URL BEHIND the word you want to link from, then follow the same directions above. In the editing screen: [NINCH http://www.ninch.org]
5. The TOC is created when you use the second level heading button...it is the "A" button. Here are the steps:

figure d

From: Stuart Glogoff
Subject: Glossary-pedia assignment
Date: Summer 2004
To: IRLS613 Class

"I find your comments about the ability to build encyclopedic type information from a community of users an interesting idea. It is certianly the concept behind the Wikipedia project. One of the things you have learned most likely in some other SIRLS course is that reference works such as E.B. (Encylopaedia Britannica) have been regarded highly because they commissioned authorities to pen essays in areas of their expertise. So it does beg the question: if we collaborate and anyone can share their ideas, how do we control the biases, control the quality, and assure the content of the product? It's an interesting rhetorical question, at least to me. Has the Internet sort of dumbed down our acceptance of the information we find on a given topic?"

figure e

Following the Wikipedia-Siegenthaler episode was Jim Giles' Nature article, "Internet Encyclopaedias Go Head to Head," (Giles) and reports of the Nature article's findings by major media outlets such as the BBC. (BBC) These reports expanded discussion about uses for wikis and the Wikipedia in particular. In response to dialogue he heard, well-known futurist Mark Prensky published an essay on his website entitled "Search vs. Research: Or, the Fear of the Wikipedia Overcome by New Understanding for the Digital Era." (Prensky) Prensky encourages educators to teach students to "understand both the power and the limitations of all the new technological tools that are, and will increasingly be, at our kids' disposal. It is our job to show them how they can use all these new tools well, and wisely." In July 2006, a balanced look at Wikipedia's evolution appeared in The New Yorker (Shiff). Instructors interested in discussing the Wikipedia, or more generally the role of a wiki as a factual knowledge resource will find this article an excellent resource.

Fall 2005 and Spring 2006 IRLS 571 Introduction to Information Technology

During fall semester 2005 and spring semester 2006, I taught IRLS 571, Introduction to Information Technology. IRLS 571 is designed to introduce the basic concepts and applications of Internet-related information technology and its impact on individual users, groups, organizations, and society. Topics in this survey course include computing basics, network applications, human computer interactions, computer-supported collaboration, social aspects of information systems, and some economic and legal issues related to digital services and products. The fall semester class utilized blended instruction and the spring class was delivered online. Each class had a wiki assignment in addition to using a learning management system, threaded discussion forums, blogs, chat rooms, email, the Web and podcasts. Assignments were posted as entries on the students' individual blogs and in podcasts that they created.

The wiki assignment was included in the course content module for communications and collaborations technologies. My primary interest in this assignment during fall semester was for students to have hands-on experience using the wiki and be able to frame, conceptually, real-world uses for wikis in libraries. Students first developed a basic understanding of wikis by reading Wikipedia articles for various communications and collaboration terms. These terms were: wiki, video conferencing, instant messaging, web cam, Internet Relay Chat, chat rooms, WebBoards, and weblogs. Since students were using individual blogs to post their

assignments and optional entries related to course topics, I asked them to consider how the Wikipedia article on weblogs compared to their experiences using a blog in the course.

Other activities in this module had the students creating an instant message account and sending an instant message to a classmate; attending an online seminar that reviewed the features and functions of Adobe Breeze; and visiting WebEx's website to learn how this product is used for help desk support, online training and on-demand sales. There were three readings describing online communications and an assignment in which students wrote a blog entry about their experiences using different communications and collaboration tools. Their focus was using these tools in educational, work and learning situations.

The wiki assignment directed them to create a username and password on the LTC wiki. Then they created a page of content about what they had learned in one of our course modules that was previously unfamiliar. Unlike the IRLS 613 assignment, I did not engage them in a collaborative wiki activity. Spending a week reading articles, attending online seminars, and discussing communications and collaborations tools in the forums gave them a strong foundation on the topic. Now they received hands-on experience with a wiki through a reflective exercise. They improved their technology skill set by learning how to use the wiki's HTML editor to create text links. Surprisingly, none of the students took the time to add any of the features that enhance the utility of the wiki's page, such as embedding images or creating a table of contents.

The spring 2006 IRLS 571 class had similar activities as the fall class for the communications and collaborations module. However, serendipity struck with the John Siegenthaler, Sr.,—Wikipedia episode and subsequent media attention. The 32 virtual students in the spring class listened to a this WEEK in TECH (Laporte) podcast in which panel members gave their opinions on the Siegenthaler-Wikipedia event. In addition, students read reports about it in the New York Times, CNET News, and the BBC as well as the Nature article. With this background, the students' assignment was again a reflective exercise.

See what you think of a wiki as a collaboration and communication tool. Follow the link to your name and create a wiki entry on this page in which you review the Wikipedia *(figure f).* Refer to the course readings, and include at least three links to other articles that you read on the Web or in the professional literature. Conclude with your impressions of using a wiki as a collaboration tool. Be sure to put in your signature and time stamp. It's the second

box from right in the above toolbar. Consult the Tips on using the Wiki created by a few students from a 2004 summer SIRLS course. It shows you how to create a link correctly, set up a table of contents, and other things "wiki."

The majority of articles were well written and included a great deal of content. I sensed that the students were interested in this topic and ascribe their interest in large part to the media focus on the Siegenthaler-Wikipedia incident.

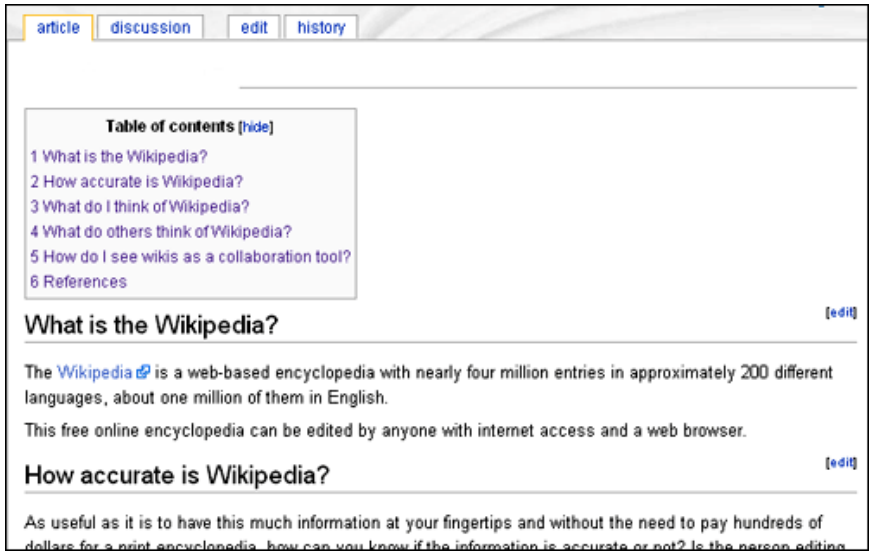


figure f: screenshot from a spring semester 2006 entry

Observations on Using MediaWiki

Our Linux systems administrator found little documentation with MediaWiki, often the case with open source software. Asking him to invest in the requisite time to develop a more secure interface could not compete with existing priorities. Our installation of the MediaWiki remains open to anyone who goes to the registration page and creates a username and password. Had we been able to close this open access, and thereby control who could have authoring privileges, we would have promoted the wiki to the campus. It will come as no surprise to readers that although we have not published the wiki's existence, spammers have found it. I periodically have to delete automated spams and send requests to our campus

network administrators to block the spammers' IP addresses. An option that would make this a moot point, is passing anyone coming to the LTC's wiki registration page to login first through the campus' authentication system. This requires linux programming and, although not an easy task, was accomplished earlier this year with our Movable Type installation. We may investigate this option in fall 2006.

Confluence

The LTC recently has installed Confluence, enterprise wiki software. Staff is using Confluence now to comment and share ideas on different projects. Programming has already been completed that passes users to the campus' authentication system when logging in. At the time this chapter was drafted, I was developing a wiki assignment for the fall semester 2006 IRLS 571 class using Confluence. I plan to place students in groups of three and assign them to research, write and edit articles related to information technology topics.

Conclusion

Having a wiki for students adds value to their learning because of the opportunities for hands-on experience. Many of my students, although matriculating in a master's level program with a strong information science focus, have limited experience with technology. The program attracts a broad mix of students from a wide variety of disciplines. Some are in their early twenties and recently earned a bachelor's degree. Others are re-entering the workforce after raising a family or are making a career change. Students taking my class the past two years have entered the program with better computer/computing skills than students enrolled in previous classes. For example, I have had students who worked in network support or on help desks, and who provided direct PC support within an organization. While these students bring a willingness to learn about technology, they rarely have had experience with information technologies such as wikis, blogs and podcasting. Beyond those students, I regularly have students who have little experience with any technologies beyond word processing. Furthermore, even among students who have experience with technology, most have not been exposed to educational technologies in the majority of their classes. Traditional bricks and mortar classroom experiences are more the rule than the exception.

The use of wikis is growing in the public and private sectors, and the tool lends itself well to a variety of learning styles and instructional applications. Assignments that I have had students do on the LTC wiki have been learner-centered, community-centered, and knowledge-centered. They have supported receptive information acquisition as well as guided discovery. Instructors who incorporate a wiki in their instruction will find that this tool affords students the opportunity to work collaboratively and improve skill sets through hands-on experience. A wiki is certainly a tool with great application for educators. Students who use a wiki will develop skills suitable for different work situations.

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4

Scaffolding Student Collaboration for Group Wiki Projects

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Introduction

Wiki epitomize, for me, the Social Constructivist idea that knowledge derives from social interactions. My personal beliefs about teaching and learning take a Social Constructivist slant that is most in line with Duffy & Cunningham's (1996, p.181-182) version of constructivism: "learning is a social, dialogical process of construction by distributed, multidimensional selves using tools and signs within context created by the various communities with which they interact." Proponents of this view emphasize the social construction of knowledge, both present and past, and the important role of cultural tools and practices that mediate social encounters and support that construction. Social software tools, such as wiki, serve to both augment cognitive process that help overcome the natural and social limitations of communication and collaboration, and eventually loop back to shape the thoughts and practices of its users like any other cultural tool.

The social constructivist concept of mediation summarizes the pedagogical value of wikis. First, wikis, like other social software tools, are generally thought to mediate social interaction and collaboration; that is, they provide a shared medium for communication/collaboration, not unlike a language. Social interaction can take many forms—verbal communication, digital

communication synchronously or asynchronously, etc. but it always involves a shared medium or channel to take place in. A wiki is the shared interactional space that fosters collaborative knowledge construction—that is its purpose. This e-space mediates for online interaction through its composition as what Perkins (1991) called a "rich learning environment"—with tools for offloading memory demands, managing tasks, accessing information, and modular building structures.

Secondly, wikis provide an exceptional way to foster student collaboration and consensus building—two critical higher order learning skills—and therefore lend themselves to group projects, online or in-class. Wikis come native, out-of-the-box so to speak, with "multiple operating instructional strategies" built-in, such as, collaborative learning, distributed learning, self-directed learning, knowledge building, and goal-based and problem-based learning that resemble Jonassen's (1999) notion of a Constructivist Learning Environment (CLE). One of the most recognized affordances of wikis is an inherent capacity for enabling group collaboration. Since the default setting permits anyone to contribute/edit content, group collaborative interaction is easily fostered and very few protocols are required to maintain a democratic spirit of knowledge construction. Wiki facilitates collaborative writing assignments similar to the way discussion board tools facilitate collaborative discursive assignments: both tools augment the ability for reflection, articulation, analysis, synthesis of ideas online.

In the following, I will sketch my experiences using wiki to foster student collaboration in an online course.

Background

EDIT 574 is a hands-on "tools" class offered online over 8 summer weeks through the Graduate School of Education at George Mason University (GMU). It introduces students from a variety of education programs to basic networking and telecommunications technologies. I was asked to redesign the course several years ago for online delivery and to include more emphasis on emerging web-based tools and technologies, such as, Internet P2P, wireless/mobile learning, social software/web services and others. I informally title the course: Educational Uses of Computer Networks. The following is the breakdown for the course syllabus: 40% online discussion work, 40% individual exercises, and the remaining 20% of

their grade would come from a group research project that required the use of a wiki. I have taught the course twice before and have used weblogs and taught about wiki, but never used the latter.

As a relatively new adjunct instructor, deviating from the traditional syllabus and planning new exercises is still a bit scary for me; I don't know where the problem areas are or if the whole activity might "blow up" on me, and result in poor student learning experiences. But I made a decision to use a wiki for this course early on—partly because a major part of the content of the course was about the affordances of social software for e-learning, and partly because I believed that a wiki was a good way to foster collaborative student learning. Moreover, since it was an 8 week summer class, the class was small with only five students enrolled, each of whom was employed full-time in instructional or informational technology-oriented jobs, and therefore, more than capable of using new web-based communication and collaboration tools. Overall, I think my constructivist teaching approach makes me a good course facilitator; I am comfortable providing students with a general outline of the course topics while structuring and supporting the learning process through specific activities, exercises, and then letting them essentially generate the contents as I respond to their work and augment their construction of meaning. The tricky part is to be able to effectively assess these kinds of learning activities.

Wiki Group Project Assignment

For this assignment, the five students were asked to work together in two small groups and to use a wiki to collectively decide on a research project topic, create a team management plan, and to assemble the research work, writings, links and other digital assets into the final product. The final project size was to be equivalent to 3-4 typed text pages (without images). The wiki would contain their group decision-making results as well as the final research deliverables and would be evaluated on both products (5% and 15% respectively).

The general topical area of the assignment was social software tools/emerging network technology, and the students were given a choice to evaluate a single tool or technology, in depth, or at a broader category level, e.g., social software as a whole, or RSS. My goal was to have them describe their topic, analyze its uses for e-learning, and evaluate its effectiveness in accomplishing its designed goal. Their deliverable was to include the following sections: a

definition, classification, technical specifications, instructional affordances, and educational uses/examples and best practices.

In addition to choosing a topic, I encouraged the groups to choose a project organizing structure as I had read somewhere that collaborative work in wikis is made easier when students have some kind of familiar structure to "scaffold" their work. The following are some examples I provided:

- website, book, tutorial
- knowledge base
- conference/symposium website
- case study
- teaching with technology guide

Wiki Group Project—Scaffolding

As mentioned in the introduction, wiki serves a mediational role for group learning and may have various forms of learning support built-in, or affordances for student collaborative work, such as its public availability, democratic accessibility, group authoring/editing options, and group communication. Still, for more structured learning goals it is often necessary for the teacher to augment wikis' inherent learning potentials with various learning scaffolds. I mentioned how structuring wiki content into a familiar form aids the group management of the work to be done. I next list three techniques that I used to scaffold the wiki group assignment.

Wiki Practice Exercises

One of the first scaffolds I used for the assignment was to create a practice wiki and to create a series of practice exercises that required them to work as a large group to organize material on a topic using the wiki tools. For my first time, I was hoping that this would give me a sense for what I might expect in terms of group dynamics and how the tool worked for a group of 5 students. After contacting me for help, I advised one student to lay out a basic web page structure for the process the students needed to describe. With this in place, I encouraged the other students to jump in and take it in any direction that made sense to them,

to add details, definitions, draw relationships, add links to sites/images etc. I instructed them to describe key terms and concepts in their own words, however imprecise they may sound, and asked them not to just copy and paste descriptions from the web. The following week, I had them practice editing one another's work by requiring them to make at least 4 new entries and 4 edits to their fellow student's entries.

NOTE: From the practice exercise experience, it became clear to me that the wiki tool I was using as part of basic suite of conferencing and collaboration tools in a system GMU supported was not as usable as many of the free, hosted consumer oriented ones that are popular on the web. Although it was part of the course site and provided a continuity that I thought was important at the time, I now realize that it is better to use easy-to-use tools even if it takes the student temporarily outside the course learning environment as opposed to using tools that are difficult or frustrating to use. For the group projects, the students were allowed to choose a wiki tool of their own or from among a few that I recommended.

Wiki Contract/Charter

The next scaffold I used was to prop up student teamwork management by using set of prepared team charter questions developed by Wicks et al (2006) (see also Wick's chapter in this book: *Navigating the Wiki Maze*). I required each of the groups to copy these questions into a wiki page and complete them as a group before I gave them the topic. The charter includes a project management timetable for the wiki. This technique empowers students to self-regulate group behavior by determining rules for managing key project tasks and appropriate responses for holding group members accountable for their roles.

Wiki Examples and Rubrics

Another traditional scaffold for student assignments is to provide examples of what you expect either by using previous student work or made up samples. Since this was a new assignment, I didn't have any prior student samples and so used close enough examples such as Wikipedia pages to provide a sense of final product. The organizing structure scaffold mentioned earlier is a related type of support.

I wanted to create a rubric to help them understand what the critical elements of the

assignment were, but did not get it done in time to guide their work; instead, I refined the categories I was working on into a final project peer-review form. Peer review activity is a useful way to get each student to take the time to critically evaluate their peers' work. This also provides a more reflective way for students to understand the nature of wikis.

Student Outcomes

Although a couple of these students had been recently introduced to wiki in work contexts, for everyone, this was their first time setting a wiki up for their own purpose from scratch. As I think back, they were all unsure about how to get started designing, collaborating, creating, and ultimately, envisioning their final product, and therefore, needed a fair amount of support and guidance throughout the process. With the help of the various scaffolds provided, all students made progress adding content and using wiki camel case text formatting to format the basic structure.

Wiki Group Project

At about the mid-point of the 8 week class, I prompted the five students to form themselves into two small groups and to choose a wiki tool from a short list of commercially-hosted wikis that were recommended to me. The following is an example of one of the group project web sites: Group 1: http://www.podcasting-gmu.wetpaint.com.

Finally, each group was required to show their wiki to the class in a formal presentation. I had planned to use Breeze Meeting as the real-time environment for this, but due to schedule conflicts I decided to have students comment on one another's project via discussion during the final week of class.

Assessment

My assessment of each of the projects was done by looking over the wiki and assessing it according to the rubric I devised, but never distributed. I used the peer review forms completed by each student on the other groups project to cross check my evaluation. The rubric/peer review forms overlapped the following categories:

Content—the degree to which the project's purpose and subject knowledge is demonstrated. Includes depth of coverage, details, and examples.

Organization & Readability—how well the content is organized using headings or bulleted lists to group related material. I included spelling and grammar here.
References—were references cited and did they link to resources and annotate references with a brief sentence.
Page Linking—were there links back to key terms described on other wiki pages and to other relevant pages. Includes presence of a page navigation scheme.
Evidence of Student Collaboration—per the rubric and my instructions, did each student in the group make edits on at least five of their peers' entries. Collaborative editing should show some evidence that students collaboratively constructed the meanings of their topic. How many edits to one another's work were made?
Group Charter/Milestones—did the group develop a plan for managing the work to be done. This was assessed using a combination of resources including email communication with me. Counted for 5% of their grade on this part.

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5

Hanging It All Out

Using a Wiki in University Research

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I started managing a three year research project for the ARC Centre of Excellence for Creative Industries & Innovation, a research institute within Queensland University of Technology (QUT) in mid 2004. Even though I have been involved establishing and running with multimedia CD ROM content production since 1992 and the Internet development since 1995, I never established a website for the creative industries national mapping project: there was no point! Establishing the traditional university passive "marketing" website for the project would have required the development of an extensive brief to the "publishing" division where every thing we wanted to say would have to be thought through, then there would be a series of extensive meetings which would generate concepts and revisions. All of this would have finally lead to a static website that no one would want to visit, least of all me. Updating it would have been a similar nightmare. And none of this is a criticism of the publishing department. The procedure is perfectly appropriate for any large organisation needing to communicate with 30,000 to 40,000 students and 10,000 staff.

However the project I headed was one of about half a dozen around the world investigating definitions and statistical techniques for measuring the characteristics of what are called the creative industries. Each researcher has slightly or very different definitions, and every country

has different conditions under which industrial activity and occupation statistics are classified, collected and disseminated. Our project was cross discipline by nature involving industry experts, economists and statisticians with our project partners contributing to the research directly and also by being part of the research steering committee. However, for the first year the collaboration aspects of the project were constrained to periodic meetings, emails and phone calls which are very unsatisfactory as a way harnessing group expertise and contribution capacity.

Instead I spent that year (amongst many other things) clarifying my requirements on ways to augment the project's capacity and influence through collaboration. I spent quite a few nights looking into various software and web-based solutions that could possible address them: FTP and webDAV servers, collaborative document web sites and, through using Wikipedia, with wikis which seemed to be closer to what I needed. I investigated establishing a wiki using a spare MacG4 I had at home as a server and the only solution close on paper to meeting my requirements, that also seemed to be within reach of my limited technical skills, was Confluence. I used the experience of setting up the wiki and using it for a couple of weeks to clarify the requirements and to better express to management why a traditional web site approach would be inappropriate.

It may worth revisiting these as they could be useful to other researchers looking to establish a wiki:

Objectives of the National Mapping Research Project Wiki

The wiki needed to provide a forum with the combination of information, participation and functionality that will attract and retain the interest of the researchers and consultants active in the field of the creative and cultural industry mapping and economic impact research. The wiki needed to not only publish information on the project and make available to others the resources from it but it needed to also:

1. Encourage and facilitate discussion and agreement on approaches to taxonomies and strategies.
2. Provide a focused forum for the sharing of drafts, papers, reports and statistics within the field.

3. To harness the knowledge and willingness to contribute that is dispersed throughout the research and consultant community and to thereby establish a critical density of talent, effort, review and resources.
4. Allow the project's contracted participants to contribute in the day-to-day work, discussions and decisions that interests them and at the time and place they are able to contribute.
5. To substantially reduce or eliminate the frustration that project partners feel at not being up to date, not being able to participate more fully and not being able to derive the short term or even ephemeral outputs they may have a requirement for.
6. To establish the CCI National Mapping Project as one of the world's pre-eminent fora in the field of creative and cultural industry mapping research.

I knew from experience that meeting these objectives would require a combination of technology capability, content that was seen as valuable, clean functional design, and an approach or aesthetic that *empowers, attracts and energises* the contributors. These last factors are very difficult to achieve and to assess in advance. By getting one of the other factors wrong it is easy to undermine the empowerment factor so that it cannot be achieved. Furthermore it is possible to meet the capability, content, design requirements and still not achieve the emergence of the empowerment factor. But it needs to be strived for.

Following on from the articulation of the objectives for the project wiki the technical requirements were established.

Sophisticated Handling of Users, Groups and Access Permissions

Having spent six years managing a research project and software company in the field of rights management I knew how critical it was to have as a foundation for the wiki a sophisticated capability of access and usage management which would require the application having an above average functionality for handling Users, Groups and Access Permissions. It would have been a bit ambitious to hope that any existing wiki solution would also have implemented a rights expression language.

I determined that at a minimum the wiki and its supporting environment needed to be able to support at least four levels of access:

Role	Capability
Anonymous Public	• Will not be able to edit pages or make comments, but will be able to see most of the site as this is the only effective way of engaging new ative participants.
Self-enrolled researchers and practitioners in the field	• Are able to see, edit and comment on most parts of the site. • Are able to add and edit pages, resources and forums.
Project partners, contractors and consultants	• Are able to see, edit and comment on most parts of the site including the project administration area. • Able to add and edit pages, resources and forums.
Project Administrator	• Manage user logins, authority levels, page and global access levels.

It was likely that at least half of the users of the wiki would not be QUT staff and so the use of QUT LDAP connected authentication system was problematic. It was not feasible nor desirable to provide QUT access accounts to all possible project contributors or even a select number of them. And to require a formal approach of "please request an account and we will issue you one in a couple of days" would reduce the number of people able to engage with the project. All aspects of the wiki had to facilitate the stages of project engagement.

The wiki was seen to be critical method with which to establish virtuous cycles which would lead to it becoming a viable dynamic community. The wiki needed to support the natural stages that people go through when they engage with a community, project or product.

Stage	Description
Attraction	The Wiki needed to be "infectious." It needed to support Google and other site ranking services to ensure the Wiki has prominence when relevant criteria are searched for. It needed to support short and human readable URLs to its pages unlike content management systems.
Interest	Once the site is reached, the "seeker" needed to be attracted to stay and explore more.

Stage	Description
Desire	The Wiki needed to be engaging so the seeker explores more deeply into the structure of the site and develops a strong commitment that the wiki can provide meaningful solutions to the seeker's needs.
Action	The Wiki needed to encourage the seeker to engage, commit and contribute to the content on the site.
Retention	The Wiki needed to be "sticky." It needed to provide real social and psychological benefits to return to the Wiki often, to participate, contribute and possibly integrate into their day-to-day workflow.
Expansion	The Wiki needed to be "infectious." It needed to encourage and support the existing participants to bring in and engage other researchers and contributors who can enrich the project.

Collaboration

The wiki needed to encourage and facilitate true multi-directional collaboration in a number of ways:

- Editing (with version histories) of pages
- Comments and threads
- Adding of sections, pages, resources and attachments
- Addition of other spaces for other project which may be highly similar or in a related field
- Federation with other projects through RSS and cross linking

Ease of Use: the Thin End of the Wedge

I knew from experience that the emotive appeal and the ease of use of the wiki would be critical to the success of the project. The usability of the wiki had to be such that anyone can feel at ease contributing without them thinking they are damaging the system or even worse thinking they have to be html coders. It was essential that the wiki was not technically daunting

or block in any way the naïve user from the act of making their first, simple contribution of perhaps making a comment or fixing a typo or correcting a definition.

With each contribution they make they gain more confidence and might start to explore how to make their posting look as good as some of the other through say bullet points or table formatting.

Addressing the "Why Nots"

Of course getting any new approach approved is rather interesting and there are the normal question of well, why not just use the corporate website. That was pretty easy to address. The next question, obviously from the IT department was, "well, we already have a content management system, why not use it?"

"Why Not Use Our Existing Content Management System?"

A competent Wiki will almost certainly include a content management system layer but the users will never see it or be aware of it. I know of no existing CMS that has built in the functionality needed for a wiki. And even if it did chances are that it would be unsuited for tailoring to meet the requirements of a wiki especially that of the ease of use. It is the psychology of the tool that is critical: CMSs are used, configured and controlled by technologists to support their objectives. Wikis on the other hand are tools focused on the needs of end users and should require even less technical sophistication than using a word processor. It would take an exceptional amount of work to make a cms into a competent wiki.

Getting it Accepted into a Corporate Environment

Approval was obtained to move the prototype I was running at home onto a linux server within the Creative Industries faculty with a 50 user license from Atlassian. Within a couple of months there were three or four additional spaces on the server for other projects within Creative Industries. The NMP space increased to about 120 pages pretty quickly and the management team started to use it and refer to it. Word spread, the QUT IT department obtained an enterprise licence of Confluence and JIRA for them to use internally with a view to at some stage rolling it out for teaching and learning.

How Are We Using the Wiki?

The wiki has been in use within QUT now for just over a year and is essentially still in the first generation of usage being fairly straight forward: the site has areas on the project background, objectives, and findings. A resources area includes links to reports and other projects. There are lots of tables and links. But the real expansion in the usage of the NMP wiki has come from its flexibility and availability to be used for projects that have a high coordination requirement within a relatively short time frame. Putting together tenders and proposals for research consortia has grown the number of spaces on the server to almost 20 with the number of registered users approaching 200. In more traditional uses aside from projects, PhD candidates have established spaces as semi-private blogs that are narratives of their research journey.

We haven't yet connected the wiki to an external database for more sophisticated reference book management nor has it been integrated with the LDAP server for authentication. But these will happen soon.

The server is managed (when required) by a QUT IT specialist who uploads and configures the server and any updates. No other technical assistance has been sought to date so augmentation has occurred only when the non technical manager (myself) could find a solution to a pressing need. So the addition of macros and other plugins has been relatively slow as there has not been enough free time to evaluate and test them. We have implemented a couple such as the repository plug (amazing!) and the formatting plugins. Being able to read excel and word files have made it much easier to post content especially formatted spreadsheets directly in a page.

The Wiki as eResearch Infrastructure

The second generation of usage we envisage as using Confluence as the foundation or infrastructure for delivering a number of eResearch services that are currently too technically challenging for the non-technical researchers or too specific a requirement for a smallish group to be justified supporting.

QUT's ARC Centre of Excellence for Creative Industries & Innovation is conducting a significant range of research over the next five years into the nature of creative industries

and creative innovation, social networks, the cluster effects and the creation and evolution of participatory media. To conduct meaningful research often requires sophisticated web-based systems where the behaviours and responses can be established and observed. But as budgets are tight it is important to be able to share and re-use not just the technical code components but also the processes, and procedures.

One way to achieve this is could be to use Confluence as a foundation service and source or develop the other functionality required on top of Confluence including new interface metaphors without detracting from its basic wiki appeal.

Research Publications, Reference and Citation Management

University research is changing in many disciplines, including creative industries. Subject matter is getting more and more complex, published material is doubling every X years. Managing your sources, key points, prioritizing and grouping references and citations used to be just hard. But with Multi-discipline teams becoming more the norm; how does a team of researchers communicate, share and efficiently manage their research source material; both original material and that from others, how do they share and preserve a link to the things they think are excellent, insightful or just well phrased and which might be useful, if not this week, next month or even next year. Online services such as CiteULike.com, and del.icio.us, and applications such as Adobe Acrobat's catalog function, EndNote and DevonThink Professional (for you Mac users) can help don't really get to the heart of a networked, group based research material resource.

The existing electronic holdings within a department of reports such as journals, articles, case studies, books could have their meta data entered into the register either manually or through pulling in references via DOIs, citation links or ISBNs. The NMP project has a relative large holding of some 1000 or so government reports that are not on standard citation systems and these would have to be entered manually.

Why is this important? To facilitate the searching and browsing of relevant research within a domain and most importantly to aid the researcher community to accrete over time its knowledge and its knowledge of the knowledge.

Researchers within a field would be encouraged to register their own reports into a

structure database with a simple forms front end which would include links to the download of electronic copies. links.

Additional functionality would allow electronic copies of reports that are held on internal repositories to be available online to authorised users. They can access the report and be able to add layers of additional information such document page and paragraph level tags (folksonomy), allow a section or paragraph of the native document such as PDF or Word to be marked up for extraction, commented on and automatically resaved onto the server. Authorised users could then search for the specific tags and harvest the relevant marked-up extracts and their references, perhaps store them in databases and then collate them into a report with citation management. Ideally this usage is then reflected back into the research archive so that you can keep track of what has been quoted.

The closest I have been able to identify is the NeuroScholar system which is obviously optimized to the requirements of neurology research. It would be excellent to be able to adapt the NeuroScholar source code which is available under an LGPL, to the more general research document requirements and to put it onto Confluence.

Project and Team Management

Confluence currently supports dynamic task lists, but research always requires more sophisticated project planning, team and task management. At the simplest putting a project proposal together with short deadlines requires online project management, task delegation, collation and reporting. And very often this has to happen in the midst of very full calendar.

The NMP project is looking for an online project management service similar to that currently offered by BaseCampHQ but on top of Confluence to facilitate the establishment and planning of projects and the tracking of tasks, people and resources.

It is possible that Atlassian could be the best organization to provide this by re-skinning a subset of JIRA Atlassian's bug and feature management tool that is the sister application to the Confluence wiki.

Network Enhancers: People, Organisations and Projects

The ARC Centre of Excellence for Creative Industries & Innovation (CCI) at Queensland University of Technology currently has a number of research projects that require it to either

establish forums for the creation and exchange of new and existing digital content or to facilitate the growth of communities of practice such as the networks between small firms and sole practitioners of different creative disciplines who could team up for a short term project.

CCI believes the answer to better understanding (say) the dynamics of Creative Industry clusters may lie in providing a Web 2.0 petri dishes: "networking sandboxes" or a "linkage enhancer" which are cobine the functionality of a "growth medium" and also provide a rich source of anonymised or pseudo-anonymised data of the interactions for research analysis. It has proposed the development of a hybrid system built on top of Confluence which is part research infrastructure, part linkage conduit and part team management.

For individuals and companies within a community or discipline members the linkage enhancer would act similarly to LinkedIn.com or orkut.com with ways to discover and maintain links with people with specific talents, products and projects in a specific domain.

Communication within the community would be facilitated through an escalation of online forums such as the traditional functions of a wiki: newsgroups, blogs, newsletters, chat and email.

Linkages between individuals, the companies and projects they have worked with or worked on would be maintained by using more structured data handled by the system (similarly to LinkedIn.com and orkut.com) but once a profile has been established, actions provide the data necessary for keeping the profiles up to date.

For firms or individuals wishing to locate a person or company with a specific skill or history of working on a project then this can be discovered through the directories built into the system.

Where a team is formed either to develop a proposal or to execute a project, the management of the team, the milestones and tasks and the communications within the team would be facilitated by the online system. In this respect the Linkage enhancer would have similar functionality to a lightweight version of Groove.net groupware.

All the time the system is managing the tracking and reporting of the activities and interactions on a number of levels some anonymous, some pseudo-anonymous and some fully identified according to system, research and user preferences.

In this way the system would update profiles with project and participation details that are suitable for publication to the public, to peers and prospects. Research on the network

effects and the growth in interaction activity can be conducted from the wealth of data that would be captured.

The deployment of the Linkage enhancer would be via local industry groups and associations hopefully with the support of local and state government. If as envisaged, the system is truly distributed then those groups wishing to provide a customised and special focus enhancer could do so without reducing the effectiveness of the linkages and network building with other disciplines and regions.

Handling , Presenting and Commenting on Structured Data

The majority of research requires the development and use of specific term most often terms that are part of structured hierarchical category or classification schemes. Developing an accurate scheme is critical for segment analysis purposes as:

- It is very difficult to capture, store or perform statistical analysis on measurements of things that cannot consistently be described. This enables use.
- Measurements of things are only useful to other parties if the other parties know what has been measured and how it has been measured in order to permit these measures to corresponds to their own approach. This requires comparable units of measurement for the objects that have been described in common. This enables re-use.

A well-structured category scheme enables the patterns and the relationships buried in diverse and large populations and collection to be seen.

Classification Registries/Commentaries

To fulfill its objects the National Mapping Project has established databases containing the hierarchical records of existing standard classifications for industry of employment, occupation of employment and qualifications. These are all then mapped to an abstract classification spine to allow a more unified view and their consistent use in analytical programmes.

It is difficult to communicate these cascades as there are many levels and many dimensions.

Outliners such as those supported by the OPML project allows a pagetree like view of a single classification structure. But Confluence does not currently support the display of OPML

files from its content plugin so we are currently working to develop such a plug in. Even when this is available it will still be difficult for another research to comment on a specific point in a cascade or to suggest an alternative.

Visualising the links between different releases of a classification or between different types of classification is difficult using drawing programs and near to impossible any other way currently.

Integrating and optimising the functionality of something like the Hypergraph plugin which uses the GraphXML with an OPML XML or a direct link to a XML based classification registry service could also be an approach.

Conclusions

The experience of the last year in implementing and expanding the use of Confluence has left no doubt to the substantial benefits of a well engineered, enterprise wiki over using a traditional web server approach. Even at its most basic level of implementation and usage, Confluence allows researchers to take direct control of the publishing and communication with their collaborators and community with a minimum of distraction.

The full potential of the wiki approach will begin to be realized when the things that previously required dedicated sophisticated application to achieve can be delivered simply and effectively by adding functionality onto Confluence. Extending the functionality through utilizing common resources, attracting a higher proportion of the interaction from a growing proportion of a research community and facilitating this in a federated seamless manner will generate substantial positive network effects. One mechanism to accelerate the research community's adoption of Confluence and other advanced wikis would be to establish focused online communities to discuss the usage and possible research specific enhancements. This should also include opt-in listings of those wikis used for research along with case studies of the impact of the wiki on the research.

6

Wikis in Education Case Study

Westwood Schools Wiki Integration

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Background

Westwood Schools is a college preparatory school in Camilla, Georgia with grades K3-12. The Westwood wiki is maintained and used primarily by technology administrator and teacher, Victoria A. Davis as the hub of her classroom management.

The wiki is used with the following classes: 9th Grade Computer Fundamentals, Introduction to Computer Science (10th), Accounting (11th/12th) and Computer Graphic Design (11th/12th) with some introduction in the 8th grade keyboarding class.

Rationale for the Westwood Wiki

There are several reasons that the Westwood wiki has become the hub of our classroom learning for upper level classes:

- Wiki creation requires students to synthesize and summarize information and employ higher level thinking skills.
- Wiki creation teaches Internet teamwork skills.
- Wiki creation supports collaborative learning strategies with a definable, measurable, meaningful result that can benefit others.

- Wiki creation gives students the audience they crave and potential rewards from parents (if it is accessible to parents) and other students.
- Wiki creation is a meaningful genuine assessment tool.
- Wiki creation is easily monitored to the teacher who uses a simple technique called RSS.
- Wikis easily imports information from other sources including teacher and class blogs, school calendars, school blogs, and most online content created by a class.
- Wikis can be accessed from any Internet-enabled computer.
- Wiki creation teaches Information literacy as students must discern the validity of sources and present facts on the topic at hand.
- Joint access of the same wiki between classes promotes a synergy of discussion and sharing on topics relating to the computer science curriculum. It takes the subject out of the classroom into the lives of my students. Increased interest and motivation to participate have resulted.
- Wiki use fits well with the Socratic method (teaching by asking questions) of teaching used in my classroom.
- Using wikis correctly in meaningful experiences can be enjoyable!

Pedagogy of Westwood's Wiki-Centric Classroom

The Wiki serves as a virtual hub of all classroom activities. It is a place where classroom instruction, team projects, and all online content can be posted and shared by everyone in the class. It keeps the dissemination of hyperlinks, online projects, and results simple for students (and the teacher).

Often in-class projects move from discussion to the wiki. In the Westwood classroom, the wiki is considered a place to post fact. Blogs are taught as the place for personal opinion and expression. This helps students discern the appropriate place for their information. It also integrates well with ethical discussions about Wiki-edit scandals such as have rocked our own state of Georgia recently.

Using RSS technology, I have pulled information such as the school calendar, the school news blog, the teacher blog, and other feed sources as appropriate to the home page of the wiki.

Origin of the Westwood Wiki

In November 2005, I attended the GAETC (Georgia Association of Educators Technology conference) and three amazing sessions with David Warlick. After the session, reading his book, and some recommended blogs, I made a list of all of the technologies that he and other visionaries feel are most conducive to collaborative learning.

After reviewing these technologies, I decided to:

1. Begin blogging myself and to actively participate in the blogosphere as an educator to chronicle my experiences and LEARN, and
2. Begin using Wikis with my students.

The wiki was the first technology that I chose to deploy in my classroom because our curriculum director has sponsored several training sessions on cooperative learning, authentic assessment, differentiated instruction, and the use of graphic organizers. As a result, I just felt wikis fit better with the current educational research I'd seen and with my Socratic teaching method. I also needed something that would work on the older computers we had at the time with minimal system requirements and no set up.

I planned to introduce wikis once and move on, but the increased learning and retention from my students on our first project on Web 2.0 (see Purpose #3 below for a description) caused me to continue using wiki projects as appropriate. While wikis are just one of the many tools we use in our now-state of the art lab, it remains the hub because it works to improve student learning and engagement, and make my classroom easier to manage.

In December 2005, the Westwood wiki was named the "Wikispace" of the month. Since then, it has been covered in dozens of news media outlets, and most recently in a Boston Globe News Article about wikis in education.

Structure and Activities on the Westwood Wiki

The Wiki has a home page which is now a mashup with posts from my class blog, the school news blog, and the school calendar. It has become a one stop place for my students to see what is going on in computer science and at school. I also keep a listing of all past projects on the home page as well as a listing of current projects. Although I often give the assignments

orally or on paper, I give them on the wiki also. Here is how this works for us:

Purpose 1: Lesson Summaries

Ninth Grade - Computer Applications - Each team is assigned a lesson. They use the wiki to create study sheets and notes for their assigned lesson. (PowerPoint, Access, Excel, Planning Skills, and a project on mashups are examples.) By the day before the test, it is their responsibility to create a wiki on their assigned lesson along with their partner. I require them to have at least two outside sources and a graphic on their page.

Although it is a team responsibility, I make it clear that I give individual grades. If they do not contribute to their team wiki, they receive a zero. This keeps everyone motivated and working! The result of this work is information that the students can study and search later in the year. It is also a reference for other students (and teachers) who are not taking the class but want to know "how to" do a certain task. Upper level students created wikis to review for the SAT (Examples: Math—7th period, Math—6th period). They were able to review their notes as they took the SAT various times during the year.

Purpose 2: Collaboration of Notes

Computer Science (10th, 11th) - After our end of semester assessment, students used the remaining two classdays to create a study wiki on the subject of their choice. The students were to select the subject area of their choice and were paired with other students interested in collaborating on that subject. They then perused their notes, textbooks, and other materials to create wikis that were amazing compendiums of a semester's worth of work. I must say that I was impressed with the biology page. I also was quite pleased with their review material of *The Scarlet Letter*, *King Lear*, and their English Exam Review. (See the links to these on http://westwood.wikispaces.com/Westwood+wikilinks+page.)

I assessed them on the creation of their wiki and their contribution. This was when interest was generated among the other teachers who commented on the thoroughness and excellent work. I also spent some time contrasting ethical and non-ethical academic use of wikis. (Posting answers to tests = unethical. Sharing notes and online discussions = ethical.)

Many colleges are seeing such note collaboration occurring spontaneously with mixed responses from their faculty, ours was favorable, but largely, I think, because our work was preceded by discussions of wiki ethics.

Purpose 3: Concept Introduction and Exploratory Projects

Computer Science (10th, 11th) For the first wiki project, I was a beginner at Web 2.0 technologies. Accordingly, I used a wiki project to launch an exploratory project about Web 2.0. In my blog entry on December 9th I go into greater detail, but here is the synopsis of how I began..

I split my two computer science classes into teams of 2-3 students in each class and gave each group one word. Their assignment was to explore and create wikis on each topic in a collaborative effort with the team in the other class to help them understand the emerging concept called Web 2.0. The six words were: blogosphere, wiki pages, social bookmarking, podcasting, RSS Feeds, folksonomy. At the conclusion they were to demonstrate the topic to the class and lead a class discussion about it.

I gave them several guidelines:

1. I asked them to post meaningful, relevant information on their topic.
2. I asked them to summarize information they found on the Net and to link to it.
3. I asked them to continue to read their topic and ask themselves – "What do I not understand about this topic?" and then to proceed to answer that question and post their findings.
4. I asked them to use some of the websites that they were learning about and to post their experience.
5. They were not allowed to delete information of another unless it was redundant or they paraphrased/edited it to make it better.
6. On the third day, I gave each team 5 minutes to present their topic – they had to summarize and demonstrate the use of their term in action.
7. At the conclusion of the presentation, I asked all students to post a comment on the wiki page of the team that was presenting to provide feedback.

I really planned to just use the wiki once to introduce Web 2.0 and then move on, however, the increase in student learning and engagement brought me back to the method. I found that it meshed beautifully with the Socratic teaching method that I employ. We've continued to supplement everything we do with the wiki.

Purpose 4: Dissemination of Important Classroom Learning

All classes. If we have a team project where each group reviews a different topic, I almost always conclude with team wiki projects. Recently, after completing a module on Computer Safety and Privacy, my students had the following instructions:

"After completing our presentations, you are to go to the wiki for this chapter of our 'wiki book.' Using at least two additional online sources each, write a summary of the important information from your section. Your audience is a computer beginner. You may include hyperlinks and should also include graphics. Be careful NOT to plagiarize anything from your book."

My Computer Science class is producing excellent college-level work that is not yet cluttered with "geek-speak." We are discussing publishing a wiki book with their material to help their parents and grandparents understand more about computers.

When our classroom becomes educated, the wiki becomes a springboard through which they educate others in their lives. The students often become excited about a topic and passionately pursue knowledge. Many of them have become "experts" on esoteric computer science subjects such as mashups, phishing, the ethics of computer crimes, and countless others. It has been fascinating to see the powerful results of this tool as it engages and excites students in the subject I teach.

Purpose 5: Individual Assessment Projects

As our school has moved away from traditional semester exams to genuine assessment projects that cumulatively assess. We were trained on the genuine assessment techniques and asked to propose a technique to accurately assess cumulative student knowledge of our subject in a meaningful and "genuine" way. I turned away from my 250 question, 2 hour exam to a multi-week wiki project in Computer Science.

I had two scenarios to which students were allowed to use their books. In each of these, they had to apply what they had learned about computing to either recommend a computer for a grandfather or a college student based upon certain criteria. You can review these projects at: EXAM - Scenario 1, EXAM - Scenario 2.

The assessment was open book and they said it was harder than any exam they had ever taken. I thought that it took more comprehension of the subject than other options. They emerged from the first semester having more knowledge than my previous classes.

They could review each others work, but I found it did not cause plagiarism but rather, spurred students on to greater excellence and to recall more detail that they needed to analyze for their own projects. It also gave students who had a difficult time to get started that little push in the right direction.

I read the projects carefully for wording that did not seem to belong there but did not find any trouble with academic dishonesty. I assessed the students based upon a grading rubric that I had created prior to the project's initiation.

During second semester, I used the wiki for a Section of their portfolio. They had to use and evaluate a Web 2.0 website and create a wiki with their findings. They found some useful and important Web 2.0 sites and shared the benefits with their friends. (See the study buddy evaluation for an excellent example of this project.)

Purpose 6: Rewards

All classes. Partial reinforcement is a powerful reinforcement. When my keyboarding class broke 70 words per minute, I posted it on the wiki. I have also created a "Wiki Hall of Fame" as well as a Hall of Fame for my blog and scribe postings. I also post and link to their wikis from the School Website. Parents like to see the amazing work that their students are doing.

Student Reaction

I'd like to go back to one of my early blog posts on December 9th that represents how my students felt about the wikis after first introduction:

> *"But my amazement came afterwards as I walked through the halls. Two girls attracted my attention with their squealing - I asked what was up with them - They were squealing about the English material going on the wikipage! It was going to help them on their project! They were so excited. They practically drove me crazy the rest of the day getting passes to come in and update the information for their exams and projects. Other teachers started coming to me and asking what was going on. They couldn't believe the amount of material synthesized and summarized in one class period!"*

My last period class heard from the others about the "do it yourself" project and then came the most astounding idea of all—the 10th grade study hall! They created a place to post projects and assignments and invited each other to their wikispace. Then, they created links to the websites that their fellow students had created to help them study/ review/ complete the project. They are used to copying notes for one another—but now they can collaborate on notes! The results are astonishing!

This is what is most amazing—the buzz in the hall with students talking excitedly about *King Lear*, *The Scarlett Letter*, the poetry project, the History project, and what other information they need to post to help!

Like anything, some students "moan and groan" about wikis. They are also the same ones who moan about anything requiring effort. What I have seen, however, is that grades on tests have improved, participation in class discussion has improved, and knowledge of the subject matter has improved. With wikis at the core of my classroom, it has become our "hub of knowledge transference" as students share and collaborate. I have been more than pleased.

As a recent blog "question of the week", I had my students compare and contrast wikis and blogs. Here are a few excerpts about what they think:

> *"Wikis are I think a lot more efficient than blogs."* 9th grader
>
> *"There is not a large difference between blogs and wikis. Blogs are more like an online journal and wikis are more for the classroom. Although wikis are more for the classroom we use both wikis and blogs a lot."* 9th grader
>
> *"Blogs are more opinionated than wikis, because wikis are a collaboration of facts by every individual student... Blogging is more popular and more people are aware of it. Wikispaces are a fairly new concept which leads to not many people knowing about them. A wikispace is more of a discussion than blogging, because blogging is one person's opinion with other's comments on it. Wikispaces are also aimed more toward the "classroom" setting rather than personal home setting."* 9th grader

I also recorded our classroom discussion held on 1/18/06 about what students think of wikis. They are pretty honest.

Teacher Reaction

Like anything new, I struggled at first. But fear is a great motivator and I was afraid that I wasn't covering everything I needed to in Computer Science. Their research and mine showed me that indeed these technologies are driving our society in ways that we do not as yet understand.

I enjoy wikis and feel that for classroom teaching, that this new medium cannot be beat! I'd like to start seeing more wiki textbooks where I can add exercises and information as can other teachers. It could be a very helpful tool for teachers around the world and a great way to share best practices. As the student above state, it becomes more than the opinion of one person but a shared opinion. That is very valuable to educators.

I grade these wikis by subscribing to the wiki over my bloglines account. It shows me simply who is working on what and gives me an easy tool to use as I grade their work on the wiki. I expect that as wikis mature that more robust methodologies will be developed to streamline teacher assessment further.

7

Navigating the Wiki Maze

Using a Wiki Tool within a Course Management System

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Introduction

Wikis are incredible tools for collaborative learning. Students can engage in inquiry learning activities, working with peers to construct content rather than just exchanging ideas. Learning how to teach using student-created wikis can be compared to navigating a maze where pedagogical solutions are found after trying several wrong paths. In this chapter I will share my experiences with student-generated wikis using a course management system.

Seattle Pacific University's entry into the wiki maze began when a geography professor returned to the classroom after several years as an administrator. She immediately noticed the impact the internet had on her students in terms of the amount of information/disinformation they had access to and how frequently they used the internet as a primary source when writing. She recognized that her role as instructor needed to change. Long hours spent in the library searching for content to use in lectures needed to give way to a new learner-centered teaching method (Ellis, 2004) where the focus is on helping students discern and make meaning of information they find with a few clicks of a mouse. The professor found inspiration in Thomas Friedman's (2005) book, *The World is Flat*. She is inspired by his open source content goal: give "every single person free access to the sum of all human knowledge." From this book she

also learned about Wikipedia (Friedman, 2005) and wondered if a similar tool could be made available in the classroom. She recognized the potential of using such a tool, allowing students to collaborate online to create articles.

Finding a Path

The geography professor came to Instructional Technology Services for help in finding a wiki authoring tool. There are a wide variety of wiki authoring tools available (Clallborn & Reimann, 2005) and assistance with determining selection criteria (Schwartz, Clark, Cossarin, & Rudolph, 2004). One of our primary considerations was determining whether to take a path leading to a publicly available wiki tool or choosing the path leading to a tool that would reside within existing courseware. For our situation we decided that it would be best if we used a tool that worked within our course management system (Blackboard) with the hopes that this would simplify access and use. We settled on Learning Objects Inc.'s Teams LX tool which is a Blackboard Building Block. The Teams LX tool can keep track of individual participation statistics which helps hold team members accountable for their individual work on group projects. Each page in a Team's wiki can be "played back" to view contributions as they occur. The wiki editing component in version 2.6x of Teams LX aren't as robust as other wiki authoring tools as there are limited options for fonts and image inclusion but the environment is sufficient to meet the basic needs of collaborating students. The wiki editing and authoring features in version 2.7x are more robust. We began using this beta version in October of 2006. It is several weeks away from a full release.

To fully support the university's entry into the use of wikis, I entered the wiki maze myself. I began by incorporating the use of student wikis into an online course I was teaching. My first attempt was in an educational technology course where one of the objectives is to gain a deeper understanding of computer networking nomenclature in order to better understand how to design a classroom learning environment. The course had already begun, so I chose the path of offering students extra credit for adding or editing entries in a wiki dictionary of networking terms. This path quickly led to a dead end as only two of twenty students made entries during the term. There may have been greater participation if I had made the assignment a requirement. However, even with points being used as a carrot, the project still may have led to a dead end because students weren't prepared to trust definitions created by

others when individual grades were on the line. Their contract was with the instructor, not with other learners. These students are like many who have learned from instructors using knowledge-centered instruction (Ellis, 2004). They expect the instructor to be the source of all course knowledge. Students may need a contract with teammates to build trust. A society-centered model may be a better model (Ellis, 2004). A method for doing this will be explained later in this paper.

Reflecting on the missteps made by myself and others during our first attempts to use wikis, I reassessed my pedagogy for future courses. The primary change was to implement small groups of students to collaborate on real-world challenges using a wiki as a common space for all work on a project. Other changes were made as well. I will provide an overview of these in the next section.

Assignment Walkthrough

Students are assigned to teams during the first week of the term. The instructor may randomly assign students to teams or base group formation on a common characteristic such as all members are social studies teachers. Teams are then provided with a case study that puts them into a real-world problem solving situation. The case study contains four to six milestones. Each must be completed by a specific date during the course. The first milestone requires students to complete a team charter (Palloff & Pratt, 2005) where they agree on a team name and code of conduct. Each team is given a separate folder in the Assignments area of Blackboard with a wiki, discussion board, and chat area. The remaining milestones walk teams through the process of designing and completing their projects. A student must post their thoughts on completing an individual milestone on the team's wiki before the team begins work on a collaborative response. This is believed to help give all students a voice. Also, it limits the possibility of one person doing all the work. Typically, one of the milestones has teammates review the work of another team and provide that team with feedback. The team then uses the feedback they received as well as the feedback they gave others to reflect on how they would improve their deliverables. Making the actual changes will depend on the amount of work that needs to be done and time remaining in the course. Students reflect on their own contributions to the project in the last milestone. The team writes a collaborative reflection on how well the team did in staying true to their charter. Students receive two grades after their

team completes each milestone. The first grade is a group grade that is based on the quality of the team's work. The second grade is an individual participation grade that uses a rubric which evaluates the student's contributions in completing the milestone. The following link provides an example of a case study using student created wikis: Case Study from EDTC 6536.

Reactions

The majority of students have been positive about using a wiki environment to collaborate on a group project. Several have asked why face-to-face faculty don't use this tool for their group projects. Out of approximately 25 teams I have had, only one group complained about a negative experience. This group was in trouble from the beginning as they were never able to satisfactorily complete the Team Charter. I offered to split the team up, and they chose to stay together. In the future, I will automatically split a team up that doesn't complete the charter by the due date specified in the syllabus. This should motivate teams to get the first milestone completed as no one wants to join a new team after a team has already defined roles. An accountability feature that students like is the "play back" feature. Any participant can play back the history of a page and see exactly who made each contribution and when. Students like how this feature exposes slackers.

There have been some technical challenges but students seem to work together and teach each other how to navigate within the wiki environment. I encourage students to author their initial contributions in Word, then cut and paste into the wiki. They aren't as comfortable composing in the wiki environment which is okay because there are more possible points of failure in a networked tool. We can't have students losing major parts of their work because of a failed internet connection.

Instructors are excited about using the Teams LX tool to set up wikis for group projects. They like how it helps to organize student work. Most of their questions seem to revolve around pedagogical issues like group size, choosing an engaging project topic, etc. Here are list of questions I have compiled after several workshops with faculty:

1. Should a wiki authoring tool be used for group or individual work?
2. Should instructor help groups with organization?
3. Should there be a single point of assessment or multiple points?

4. Should students be required to make individual contributions before collaborating as a group?
5. Should the instructor provide an anchor document to help students understand what a successful project should look like or will that lead to "cookie cutter" projects?
6. Should students post all work for a project in the wiki environment or only the deliverables? (process/product)
7. Should wiki creation be "played back" to assess individual student participation?
8. Can wiki statistics alone be used to assess level of participation?
9. Are non-technical students disadvantaged by being asked to collaborate in a wiki environment?
10. Does a wiki environment motivate students to collaborate on the construction of knowledge?

Choosing successful answers to these questions can help an instructor navigate through the wiki maze. Paths leading to correct answers to some of these questions are beginning to become clear while others remain a mystery.

Conclusion

Students will generally say they don't enjoy group work because one person ends up controlling the project or doing all of the work while individual grades are at stake. A wiki environment can democratize group work by giving all students equal access to team documents. Students can be engaged in inquiry-based learning using a tool that includes statistics to hold all team members accountable for their individual work. Graduate students are frequently asked to work in asynchronous discussion environments. They are comfortable interacting with chronological comments. A wiki environment can stretch them to extend or counter others by editing rather than replying, organizing thoughts by content rather than chronology. The explosion of tools like Wikipedia forces educators to exam the reliability of its content. Having students work in a wiki environment allows them to see both the value and shortcomings. Future educators need to be informed consumers of available resources. Whenever technology can be appropriately integrated into a learning activity we get the benefit of double loop learning (Palloff & Pratt, 1999). Students can gain knowledge about

the content of a course while improving their technology skills. Student success is dependent on successful implementation by instructors. This paper has provided some suggestions for organizing group projects. It has also raised questions for future inquiry.

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8

Constructing Science Knowledge

Stewart Mader

The editorial article "Wiki's Wild World" in the December 15, 2005 issue of Nature came on the heels of a high profile study comparing Wikipedia and Encyclopedia Britannica in which Nature editors concluded that, for science articles, Wikipedia was as accurate as Britannica. This article encourages scientists to embrace Wikipedia, not as an overt replacement for longstanding resources like Britannica, but as a "grand experiment" that has the potential to put a vast amount of constantly updated information in any person's hands. Because of this potential, and growing reality, Nature encourages scientists to make sure that what others read about their disciplines on Wikipedia tells the right story.

Nature did a commendable job of making this article clear even for the least scientifically inclined reader. One wonders if an influence behind this was the knowledge that many journalists would come in contact with the article, and need to be able to quickly grasp it, understand the study Nature conducted, and communicate it to a wide variety of audiences. In the science world, when Nature speaks people listen. Add to that a controversial issue that spans multiple disciplines, and its reputation as one of the top two scientific journals in the US, and many non-scientists hear what it has to say as well.

It also raises the point that scientists can improve the available knowledge of their disciplines

by finding the Wikipedia article on their field, checking it for accuracy and completeness, and adding or correcting information as necessary. This pushes forward the idea that Wikipedia, as a freely accessible and editable resource, can be a meeting place for those with expertise and advanced knowledge of a field, and those seeking to learn more, and the presence of both can ensure that the available information is both factually accurate and readily understandable.

One of the big problems in science writing is that authors most often write for other scientists, and forget that non-scientists may also read their work. Arguably, it makes sense that a scientific piece should be written by one scientist so that another may quickly grasp the important information, and simplifying too much may make it inefficient for use by fellow scientists, but the issue of public understanding of science is equally important. If a non-scientist can't reasonably understand the content of a scientific article, how can a funding agency for example understand whether a scientist's work is worthy of financial support?

The issue of readers' scientific and technical literacy was perhaps less apparent before Wikipedia because most scientific journals have largely been the domain of the scientists authoring articles published in them. Because journals historically have had the limited audiences of their own disciplines, they have been too expensive for anyone but research organizations, corporate research labs, and universities with large science departments. Thus members of the general public have historically relied on publications like Popular Science, Scientific American and National Geographic, and the writers and journalists at those publications with professional backgrounds in science who specialize in communicating science to general audiences.

The growth of the Internet has made more scientific information available for a lower cost, but much of the available scientific information is still too highly specialized for the average reader, and so Wikipedia is especially important because the fact that articles are authored and discussed by a community means that scientists who write in too deeply technical or scientific language can receive immediate feedback from readers who can't understand what they're writing.

> *"...the average science entry in Wikipedia contained around four inaccuracies; Britannica, about three.*
> *Considering how Wikipedia articles are written, that result might seem surprising.*

> *A solar physicist could, for example, work on the entry on the Sun, but would have the same status as a contributor without an academic background. Disputes about content are usually resolved by discussion among users."* [2]

This illustrates how articles written collaboratively by community members with varying levels of expertise can be as accurate as those written by just a group of experts. It's not to say that any group of people can write an accurate article about any subject—expertise is necessary to ensure that the information contained in the article is correct—and non-experts are necessary to ensure that what's written makes sense to the average reader, and a structure which deliberately enables contribution is necessary to bring these two groups together on equal ground. Wikipedia is unique and encourages an incredible rate of information growth because it is astonishingly easy to use and because the information is seen, especially by students, as a more practical, useful starting point for learning and research.

Those in the other side of the debate naturally criticize the Wikipedia model as incapable of matching Britannica. For example, "former Britannica editor Robert McHenry declared one Wikipedia entry—on US founding father Alexander Hamilton—as 'what might be expected of a high-school student'. Opening up the editing process to all, regardless of expertise, means that reliability can never be ensured, he concluded."[2]

This statement effectively shuts out non-experts from the process of information-building, and furthers the idea that only experts have the authority to communicate about their fields. McHenry argues that when the editing process is open to everyone reliability can never be ensured, but the results of Nature's study shows that closing the editing process to only the hired staff of a closed publication can't ensure reliability either.

In contrast to closed publications like Britannica, what Wikipedia encourages among non-experts and experts alike is interest in a broader array of topics than they might otherwise have had the opportunity to come in contact with. This may lead people to pursue careers in fields that need more experts and deeper study, and may further the development of interdisciplinary ties. A social environment in which people have the least possible barriers to both accessing and building information enables the most efficient growth of knowledge because a greater number of people are involved in the process, and more people are able to find and contribute to the topics they are most passionate about.

Wikipedia also demonstrates and unprecedented level of transparency in the construction of a source of information. As consumers of the information in Britannica, we are told that groups of experts have written the articles between its covers, but we don't know how those experts were selected, what biases they may have against particular information in a field, and how they have decided, both individually and collectively, what to include in the published articles. Thus we must take at face value what we are presented, and have only the final product to work with. By design, wiki software tracks all changes to every page, so the progression of information growth can be traced from the first word to the article as it presently appears. Here again, Wikipedia offers something that challenges Robert McHenry's claim that reliability can never be ensured in an open model—it offers us the ability to see the composition of the group authoring an article, to find peoples' biases based on what they add or delete, and to understand how people individually and collectively decided what to include. When people have a debate about the accuracy of information in Wikipedia, they are engaging in an activity that is not possible with Britannica. Because Wikipedia is multidimensional in this way, and presents both the information itself and the "identity" of that information, people are given the ability to debate that invigorates interest in topics and keeps information from becoming stagnant and unreliable.

This is a new dimension for publishing, information architecture, sociology of information, communication, and any other field that concerns itself with information, but more importantly, a new dimension for society itself. Students learning in any discipline, including those studying science, now can see why the facts and ideas that dominate a field have reached prominence, and can better trace their origin. Perhaps this will narrow the gap between those with greater and lesser levels of science literacy. Information grows more complex over time, so being able the access the history of information growth via the wiki timeline may help non-scientists understand a complex piece of information by first learning its less complex origin, and then tracing the elements of its identity over time.

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[1]"Wiki's wild world" Editorial, Nature 438, 890 (15 December 2005).

[2] "Internet encyclopaedias go head to head" Nature 438, 900-901 (15 December 2005).

9

Wikis in the Academy

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There is a certain poesy to the notion of socially constructed knowledge. As educators, we like the idea of students learning from one another and providing each other with ongoing feedback that we are not always able to provide due to realistic constraints on our time. But what's the best way to construct such experiences?

In the past ten years, several (now) popular pedagogies have emerged which are designed to focus students on teaching one another, both in and out of the classroom. Eric Mazur's (1997) Peer Instruction prescribes an approach in which students in large lectures debate the finer points of the high-level the conceptual course content instead of always focusing on factual and procedural knowledge. Wiske, et. al (1998) emphasize peer assessment as a staple of their larger discussion of ongoing assessment. And the ubiquitous How People Learn (Bransford, et. al, 2000) emphasizes the importance of community as central to productive learning environments. The consensus seems to be in on the importance of socially constructing knowledge.

Wikis have natural appeal as a tool for creating communities of learning. At their simplest, wikis are just web sites that can be edited from a web browser. Generally, wikis start off completely stark, with nothing more than a blank home page. What goes on the home

page, and all subsequent pages, is up to the wiki members—in the case of course wikis, the instructor and students. The fact that the canvas is bare allows the class collectively to create course materials, and to determine when, where, and how that content should be presented.

We are not advocating a "build-it-and-they-will-come" model, however. Too often we see the misapplication of technology in the classroom, conducted in a way that is ill-conceived, and does not leverage what the technology is really good at. Or, perhaps worse, instructors who simply "turn on" technologies, assuming students will flock to using technology simply because it is there. We strongly believe that, to be useful to instructors and students, technology in education must be applied in a way that mindfully supports the instructor's learning goals and also must be integrated into the course curriculum such that the learning supported by the technology is clearly valued by the instructor. While it is beyond the scope of this article to discuss the specifics of aligning student work with instructor's learning goals, this process should not be ignored. A good rule of thumb for instructors is this: if you don't value the work enough to grade or assess it in some way, students aren't likely to value it enough to put in the time to do it.

With all of this in mind, we present the following vignettes of practice using wikis in the classroom. Over the past year, the Center for Scholarly Technology at the University of Southern California has conducted several pilot projects with wikis that demonstrate some of the different affordances of the technology, and their benefits in the classroom. We hope that this discussion may prove provocative and generate ideas for use in your own classroom.

Sandra Chrystal: Collaborative Business Writing

Sandra Chrystal started using a wiki in her Advanced Writing for Business classes a couple of years ago for two reasons: she wanted to upgrade her practice of requiring students to reflect on their writing process in electronic journals, and she wanted to cultivate more interaction among students in her blended/online class. Those goals were successfully met after the installation of a common wiki for her combined classes and a personal wiki for each student, but she soon discovered that the wiki experience also fostered more writing and student engagement than she'd anticipated.

Transportability, time required to access students' writing, and the belief in writing reflections moved her to find an alternative that was more accessible to students and to her.

Electronic journals had always generated an important meta-cognitive function for students and provided another means to interact with the individuals about their learning, but they were cumbersome to work with. Over the years, the medium evolved from hardcopy to diskettes, then to digital dropboxes, and more recently, to email attachments. Her receipt of a "quick start" grant, however, provided her with the social software and the training to install a wiki into her classes.

As it turned out, the two-fold wiki met her expectation for students' reflections and for ease of transportability and reading, but it also opened new avenues for engaging students in their learning and for increasing their skills with professional writing for business. The wiki grew—almost into a polymorphous entity. Students learned to use the two main streams: a class weblog and their individual electronic journals. The class weblog, originally designed to increase blended/online students' interaction with one another, opened to residential students which further decreased students' isolation and provided a common knowledge site shared by the two classes. Students posted drafts of their documents for peer revision recommendations; collaborative teams posted their work with one another; students posted writing and ethics advice after they interviewed community professionals, and students continued class discussions. Students raved about the practice of posting the best papers on the course weblog so grading wasn't such a mystery and liked the opportunity to blog as many corporations do.

Chrystal learned more about her students' writing by reading their private journals and by building her conferences around those entries. She also learned what they took away from their conferences and their class assignments during the semester, rather than waiting for more ambiguous evaluations at the end of the semester. She prompted responses for individuals' journals as a piece of all major writing assignments and required course weblog posted drafts for documents, revisions on others' work, and quotes garnered as a result of interviews with corporate professionals.

Chrystal discovered a rich source of data for further investigation and pedagogical implications. Her Teaching Assistant, Fiona Torrence, compiled totals for the Spring 2006 students' entries in three classes; one of the three was a blended/online environment.

Writer Demographic	Number of Entries
Male students' total entries	123
Female students' total entries	77
Male students' e-journal (personal wiki) entries	281
Female students' e-journal entries	210
Male students' prompted responses	272
Female students' prompted responses	203
Male students' non-prompted	11
Female students' non-prompted	8
Total prompted responses	475
Total non-prompted responses	19

Any Challenges? Frustrations?

Yes, the system frustrated students sometimes: it failed a couple of times—usually when the students were required to post a draft for peer revision; the software provided flexibility, but required time to set-up a class and to mine the results; frequently the system laboriously chugged through its operations.

She argues that the wiki enhances learner-centered education, broadens students' reading audience, provides a supplementary knowledge site, facilitates team projects, and supplies metrics for educators to build on.

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Wiki-based Collaboration and Academic Publishing

Stewart Mader

Help write this chapter! Edit the draft I've posted here, and add your revisions and suggestions for this new teaching method.

This project will use the wiki, a web site that can be collaboratively edited using just a web browser for college chemistry and physics students to prepare and publish papers just as practicing scientists would. It makes use of The Science of Spectroscopy, a wiki-based learning tool developed with support from NASA that teaches spectroscopy using a model where students are introduced first to applications, and learn the underlying techniques and theory as they explore applications that interest them. The site was originally built in 1999 to teach spectroscopy more visually using technology, and was converted into a wiki in 2004 to accommodate the growing number of educators who were offering content to make the site more relevant to their own teaching. This project aims to take participation to a greater level by directly involving students in the creation of the material they study, and moves them from passive consumers to active participants in their education.

Working in groups intended to resemble scientific research groups, students choose an existing topic or propose a new topic for addition to the site, with the understanding that the paper they produce will be peer-reviewed and published directly on The Science of Spectroscopy wiki. Initially, each group is given a private wiki page that only group members can edit,

which they use throughout their research, writing, and revision. As they research the scientific literature and informal science publications, each group will use the wiki page to document sources, take notes, and outline their paper. They then use the information gathered to prepare a paper, using the wiki as collaborative writing space. Along the way, the teacher can check their reference collection and notes to be sure they're on the right track and provide guidance on their draft, just like a colleague might do for a paper to be published. Once paper drafts are finished, each group submits their paper for peer review by a small group consisting of their teacher, wiki website publisher, and another teacher or scientist familiar with the course subject matter. Comments are posted by the peer-review group on the wiki page, and each group is given time to incorporate them before submission for publication in the appropriate topic page on The Science of Spectroscopy. This model motivates students with the idea that a high quality final product will be published for the world to see, so the quality of the finished product becomes more important than just a grade.

The goal of this project is twofold—to build the first wiki-based journal for collaborative authoring, peer-review, and publishing of student generated work, and in doing so expose students to the real workings of science as soon as possible in their undergraduate careers, help them build confidence in their ability to conduct research, and keep them on the formal path to science careers by completing undergraduate science degrees. In the same manner that open-content projects like MIT OpenCourseWare have made teacher-generated content available, this project establishes a new model in which high quality student-generated content is valued as a source of knowledge, and it is our hope that this inspires others to recognize the enormous untapped potential of student work that right now, sits static on countless students' computers after being read by, in all likelihood, no one other than their teacher.

The potential of this model is national, even international, in scope. As an example, The Science of Spectroscopy has contributors from Indonesia, Germany, Sweden, Poland, New York, Maryland, and California; because the wiki is completely web-based, takes just a few minutes to learn how to edit, and does not require a high speed Internet connection it promotes complete equality throughout the community. Science disciplines may be the quickest to adopt this model simply because there's a parallel in both structure and content, but the model for wiki collaboration and publishing can easily be applied to any discipline. One product we intend to develop as this project progresses is a comprehensive guide anyone in any discipline can use to successfully implement the model.

11

The New Learning Landscape

Stewart Mader

How do students learn in a world where traditional assessments of intelligence are radically changing, abundant knowledge is more readily available, and learning community is more important than ever?

Technology has dramatically changed how students learn, teachers teach, and how knowledge is constructed, used, and revised. As a result, what students learn and how they learn is undergoing radical changes to make best use of this technologically empowered "pedagogical possibility" (McClintock, 1996). In "Renewing the Progressive Contract with Posterity: On the Social Construction of Digital Learning Communities" McClintock (1996) has written a blueprint for the new thinking that's necessary in our present, technologically capable world. For example, when contrasting the old role of the classroom, textbook, and teacher with the new, he says:

> *The textbook is a meager selection of what a field of knowledge comprises, a skilled teacher is a bundle of ignorance relative to the sum of learning, and a school library a sparse collection at best. Networks reaching through the school into the classroom and*

> *to the desktop are ending the isolation and substituting a rule of abundance for that of scarcity. Such a new rule is not without its pitfalls, but to cope with these we must recognize that it is a new rule, deeply different from the old. In our extended present, the educational problem changes profoundly, shifting from stratagems for disbursing scarce knowledge to finding ways to enable people to use unlimited access to the resources of our cultures.* (McClintock, 1996)

In today's world, students no longer need to live near the library of a major university or a large, culturally rich city—they have equal access to the information as those in close proximity, thanks to the Internet. Furthermore, the classroom is no longer defined by the walls, desks, and blackboard in which learning is isolated from the world, which means the classroom today should serve primarily as a meeting place in which to bring new ideas and information and discuss them as a community. In addition, McClintock observes that "new media alter the ways of knowing and the opportunities for participating in the creation of knowledge" and therefore should not be dismissed as fads but embraced and studied as unique media that are contributing to the rising status of verbal, visual, auditory, kinesthetic, and combinations of these "as serious means for creating knowledge." (McClintock, 1996) He also discusses the widely observed and sometimes controversial trend whereby technology tools can augment human intelligence by working in a complementary way so that human and machine intelligence perform the tasks for which each is ideally suited. He cites word processors monitoring spelling, databases managing large stores of information, and technology reducing the need for low-level competency as examples of this development. This is something educators have debated, with some feeling that technology creates a "black box" in which students don't understand basic processes like a graphing calculator's ability to quickly solve an integral, and others feeling that technology changes what ought to be learned to advance society. Theodore Gray (2000) makes this point in an explanation of the value of having students use mathematical software to explore computational spaces instead of memorizing a multiplication table:

> *The skills needed to live comfortably in, say, northern Europe in 20,000 BCE were extremely complex. They required then and would require now the full range of human*

> *intelligence. To think that a modern human should be able to do everything that previous generations have been able to do (hunt, speak Latin, do square roots by hand, etc.), and also have any time left over to learn anything new (microbiology, email, calculus), is basically insulting to all those previous generations, since it implies that they under-employed their intelligence. It is also quite false...Just like the breech-loading rifle, or the pocket calculator, modern tools such as Mathematica change (maybe a little, maybe a lot) the kinds of things that ought to be learned. Some things that used to be important are not anymore, and some new things have become important.* (Gray, 2000)

Gray is essentially arguing that if we spend all our time learning the same things as earlier generations, we'll have no time left to discover new things—in other words, we have to let some knowledge go in order to focus our energy towards discovering new knowledge. This is both the core, and the most difficult to understand concept for most people. Natural inclination is to judge a student's success by measuring against a known quantity, i.e. the same measurement used to judge your own success when you were a student. Therefore, it's understandable that people who say today's students should be taught and assessed differently have found their approach greeted with skepticism, and even criticism. So how do we make the positive impact of technology on teaching and learning obvious?

Embracing Wikipedia and Community Knowledge Construction

The first step is to overcome fear of new tools like Wikipedia, and explore them with an open minded approach that considers how they could be used effectively. Students already do this, and that's why they embraced Wikipedia a (relatively) long time ago. When we teachers respond negatively to students' mention of Wikipedia in class, or citation of it in their papers, we only make ourselves look clueless and unwilling to advance our own thinking beyond the resources we were told were acceptable when we were students. A better approach would be to embrace the role of expert guide, show students how they should make Wikipedia one in a healthy mix of sources, and help them learn to back-up any information they find in Wikipedia by checking secondary sources. for that matter, checking secondary sources needn't be an arduous task; presented the right way to students it can be a fascinating adventure, and finding either contradicting information or more detailed supporting information can make a research paper or presentation all the more interesting and engaging.

What scares people about Wikipedia is that it's different from any other information source they're familiar with. An encyclopedia has typically been a very static object—something that was expected to contain thoroughly reviewed, factually accurate information—and could be trusted without knowing anything about its inner workings. Wikipedia has challenged that notion in a big—and very public—way. By offering anyone the opportunity to contribute, even anonymously, it has caused a stir in the publishing industry and opened a new debate about the potential biases that can exist in a closed publishing environment where we have to blindly trust the content that editors choose to include. The journal Nature explored this in great depth last December, when it revealed the results of a comparison of 42 corresponding articles from both encyclopedias, and found only a small gap in accuracy between the two. According to Giles (2005), "The exercise revealed numerous errors in both encyclopaedias, but among 42 entries tested, the difference in accuracy was not particularly great: the average science entry in Wikipedia contained around four inaccuracies; Britannica, about three." Britannica's response to this was to criticize the quality of Wikipedia, and its community model in which an expert physicist holds the same status as an amateur astronomer, but according to Michael Twidale, an information scientist at the University of Illinois at Urbana-Champaign, "People will find it shocking to see how many errors there are in Britannica. Print encyclopaedias are often set up as the gold standards of information quality against which the failings of faster or cheaper resources can be compared. These findings remind us that we have an 18-carat standard, not a 24-carat one." (Giles, 2005) Twidale goes on to point out that the advantage Wikipedia has over Britannica is that errors can be fixed very quickly. On the surface this is shows the value technology brings to an encyclopedia, but is even more significant when one considers that errors in Britannica might not be corrected until the next edition is published.

Building Learning Communities and Encouraging Collaboration

So how does this all tie into Theodore Gray's point that to gain new knowledge we must be willing to make room for it by changing and evolving the definition of what's essential to learn? Using a wiki reduces the instances of students working in isolation and provides a good foundation for a learning community. It also makes the knowledge construction process much more transparent, and offers a teacher many more points of assessment and guidance than only seeing a student's or group's final paper or presentation. "A community of practice

also provides direct cognitive and sociocollaborative support for the efforts of the group's individual members. Students share the responsibility for thinking and doing: they distribute their intellectual activity so that the burden of managing the whole process does not fall to any one individual. In addition, a community of practice can be a powerful context for constructing scientific meanings." (Bransford, Brown, & Cocking, 2000) This kind of support can improve students' confidence in their ability to learn. Many students initially approach topics in stereotypically tougher subjects like math and science with doubt about their ability to understand it. This apprehension is confirmed when they are given assignments & problem sets with little coaching on how to develop a problem solving strategy, then left to figure it out on their own. The everyday classroom should adopt the strategies often used in tutoring programs. When I was an undergraduate chemistry major, I worked for the department tutoring program which employed the guided coaching, community learning, and problem solving strategies in small groups that should have taken place in the regular classroom. The students in this program were there because they were in danger of failing classes that were taught in the traditional, impersonal manner. Ironically, by being in danger of failing, these students had made themselves eligible for the kind of instruction that probably would have kept them far from the brink of failing in the first place.

Learning that blends community and focused guidance from an instructor can also have a very positive impact in large classes where it's very difficult to address individual students' learning needs. For example, in a class of 60, the students might be asked work in 12 groups of five to read a chapter in the textbook and identify the top five things they'd like covered in more depth. The instructor can ask for these lists to be compiled collaboratively using a wiki, and then he or she can look at what each group wants covered and what items all the groups have in common on their lists. This allows the needs of individual students to be efficiently channeled to the instructor so she or he can create a customized, more focused lecture. The presence of the groups of five gives students a second level of even more personal support, since it creates the community social structure that's conducive to group studying and greater connections between students. Portions of this idea are based on the principles of Just-in-Time Teaching (JiTT), a method developed by Wolfgang Christian, Andrew Gavrin, Gregor Novak, and Evelyn Patterson in 1999 which uses individual student feedback via email to give the instructor the necessary information to customize her or his lecture. This idea updates JiTT

to take advantage of the wiki as both a collaborative source of feedback for the instructor, and the basis for greater community and collaboration within each group.

A third idea that can increase community learning and engage students in collaborative knowledge construction is a method I've developed whereby students in a college level science course would collaboratively author a paper to simulate the process undertaken by professional researchers to publish their research in a peer-reviewed form. Working in groups intended to resemble scientific research groups, students choose an existing topic or propose a new topic for addition to the site, with the understanding that the paper they produce will be peer-reviewed and can be published on a public wiki. Initially, each group is given a private wiki page that only group members can edit, which they use throughout their research, writing, and revision. As they research the scientific literature and publications, each group will use the wiki page to document sources, take notes, and outline their paper. They then use the information gathered to prepare a paper, using the wiki as collaborative writing space. Along the way, the teacher can check their reference collection and notes to be sure they're on the right track and provide guidance on their draft, just like a colleague might do for a academic paper about to be published. Once paper drafts are finished, each group submits their paper for peer review by a small group consisting of their teacher, and another teacher, and scientists familiar with the course subject matter. Comments are posted by the peer-review group on the wiki page, and each group is given time to incorporate them before submission for publication. This model motivates students with the idea that a high quality final product can be published for the world to see, so the quality of the finished product becomes more important than just a grade. Furthermore, use of the wiki provides the teacher with numerous moments of assessment and guidance throughout the project, thus ensuring that students aren't isolated throughout the learning process.

In the larger perspective, this method helps prepare a new group of scientists who understand the new generation of collaborative technology because of their positive, productive experience with it as students. Butler (2005) explores the missed potential of tools like the blog and wiki because of the reluctance of some scientists to adopt these tools, or even acknowledge them. In an example of the powerful impact of online community, Paul Myers of the University of Minnesota says, "Put a description of your paper on a blog, and people far from your usual circle start thinking about the subject. They bring up interesting perspectives. By sharing ideas

online, you get feedback and new research ideas, he says." (Butler, 2005) As teachers, we can encourage our students to do this by giving them a good example from which to start, and the confidence that goes with it. In doing so, we can fulfill the idea that the classroom is a meeting place for the exchange and evolution of ideas.

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About the Editor

Stewart Mader is a noted wiki/social software researcher, author and speaker. He publishes the blog Using Wiki in Education, which focuses on using the wiki for collaborative curriculum development and group learning, and includes interviews with wiki makers and users, example wiki uses, and product reviews. In October 2006, he published a wiki-based book containing 10 case studies from teachers using the wiki to transform courses and engage today's students in a range of environments. This is the first book to focus specifically on the wiki in education and be developed and published using a wiki, so it actively demonstrates the tool in action.

He has taught science both in the classroom and online, specializes in using social software and wiki technology in education, and has worked with faculty to apply and assess its impact on student learning. He previously served as Senior Instructional Technologist for Life Sciences and Brown Medical School at Brown University, Educational Technologist at Emerson College, Instructional Designer and Interim Director of the Faculty Center for Learning Development at University of Hartford, and has collaborated with faculty at Long

Island University on a series of teaching and learning projects. Since editing this book, Stewart has joined the Atlassian team serving as a wiki evangelist.

He is co-founder of The Science of Spectroscopy, a project which rethinks how spectroscopy is taught by using a model that starts with real-world applications, gets students engaged and asking 'how does it work?' and then teaches techniques and theory. The web site is wiki-based, making it easy for users to quickly edit pages and contribute information using just a web browser. The project has been featured in the journals Science and Chemistry International, is a member of the National Science Digital Library and the National Grid for Learning, and was recently named a member of 33 Wikis, a showcase of the best in wiki-based collaboration. He has produced two films in collaboration with NASA. Seeing the Scientific Light and Skysight let students hear directly from scientists who use spectroscopy in their everyday work. The films have aired on PBS stations and are currently in retail distribution. He holds a B.S. in Chemistry from University of Hartford, and is pursuing an M.S. in Curriculum Development and Instructional Technology from University at Albany.